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USSR Report

CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY

No. 55

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CONTENTS

HARDWARE

Control Computer Technology Research and Production Discussed...... 1

Supplementation of Nairi Family of Computers Discussed 5

Increasing the Productivity of Computers 7

YeS-1035 Computer Awarded State Emblem of Quality 8

Serial Production of Iskra-2240 Computers Reported................. 10

The DRON-2.0 Diffractometer Automation Subsystem 11

New Unified System Computer Units 14

15 VVV 3040, 15 ST 64x64-001 Display Equipment Described 22

SOFTWARE

Programming P-Technology and Its BESM-6, YeS, and SM Computer Support 24

Multimicroprocessor Architecture of Computer Systems Permitting Direct Interpretation of High-Level Languages 27

APPLICATIONS

The Results for the 10th Five-Year Plan in the Creation and Use of Computer Technology 30

Computer Network Testing Area Related 33

Need for Computers by Plants Discussed 34

Computer Use on Earth and in Space Discussed 36

Development of Unified All-Union Automated Information Processing System Discussed 39

Increase in Efficiency of ASU Called For 40

Computer Center Efficiency Discussed 43

Data Entry at Gosbank 44

Introduction of Automated Control Systems for Production Processes Summarized 46

All-Union Conference of Computer Network Workers of USSR Central Statistical Administration 48

Automated Systems for the Control, Planning, and Organization of Production in Construction 50

The Economic Effectiveness of Collective-Use Computer Centers..... 61

A Complex of Interactive Modeling of the Topology of Communication in Large Territorial Computer Center Networks With Regard to Reliability 72

Batch Teleprocessing Software for a Subscriber Computer Network... 75

Latvian SSR Data Bank, Teleprocessing Network Problems Discussed.. 81

Personnel Resistance, Equipment and Software Shortage Plague Automation Efforts 83

Problems of ASU Engineers 85

Hydrometeorological Data Processing in Uzbekistan 87

The 'Kadry' Subsystem in Steamship Companies 88

Briefs
- YeS-1060's Installed 89
- Yearly Savings 89

PUBLICATIONS

Abstracts From the Journal 'CONTROL SYSTEMS AND COMPUTERS'........ 90

HARDWARE

CONTROL COMPUTER TECHNOLOGY RESEARCH AND PRODUCTION DISCUSSED

Moscow EKONOMICHESKAYA GAZETA in Russian No 45, 1980 p 9

[Conversation with Andrey Aleksandrovich Novokhatniy, general director of "Impuls'" NPO (Scientific and Production Association) imeni 25th CPSU Congress, Severodonetsk]

[Text] The Severodonetsk "Impuls'" NPO imeni 25th CPSU Congress occupies leading positions in the creation of computer technology. The collective has accumulated experience in utilizing the advantages of integration of science and production and has also encountered problems which require solution. Andrey Aleksandrovich Novokhatniy, general director of the NPO, discusses this.

A. A. Novokhatniy is a candidate of technical sciences. Since 1959 he has headed the Scientific Research Institute of Control Computers, now the leading enterprise of "Impuls'" NPO. He has headed the association since 1971.

The "Impuls'" NPO is a powerful scientific and production complex. It includes the Scientific Research Institute of Control Computers, its experimental plant, and subordinate to it is the Severodonetskiy Instrument-Making Plant, which is the series-production enterprise of the association, and also a computer training center and a separate problem laboratory (under the Computer Center of the Siberian Department of the USSR Academy of Sciences).

Control computer technology is the specialization of the association.

On the basis of Severodonetsk computer technology ASU's have been equipped at such very important facilities as the Novolipetskiy and Krivoy Rog metallurgical plants, the Novovoronezhskaya and Chernobyl'skaya atomic power plants, the Cosmonaut Training Center and the Nuclear Research Institute of the USSR Academy of Sciences, the country's first computer-aided system for Aeroflot ticket sales "Sirena," and many others. The M-7000 and SM-2 computer complexes assured the successful functioning of all regional centers of the ASU "Olympiada-80."

The system-integrated approach

In the association thorough program-goal planning embraces the entire cycle of work: research and development, planning, designing, the creation of computer hardware prototypes, the updating of technical documentation, organization in production, series production and introduction. Starting with the stage of scientific search and in all subsequent stages, joint work is done by specialists of the institute, the design and technological services, the experimental and series production plants, and the conditions are assured for utilization of internal reserves.

The preparation of new types of product for production still starts in the stage of their development.

Possible under NPO conditions are not only a combination of phases and parallel performance of work but also a considerable curtailment and elimination of duplication of work in individual stages, especially during preparation of series production of new articles. All this made it possible to shorten the development-to-production cycle by 1.5-2 years and reduce production expenses.

Utilization of the advantages built into the integration of science and production permits steadily increasing the working efficiency of structural subdivisions. Each new development differs from the preceding by higher technical and economic indicators. For example, the ratio of the productivity and cost of computer complexes SM-1/SM-2 is 1.4 times as large on the average than that of their predecessors the M-6000/M-7000. It is important that continuity in the architecture and structure of the complexes be preserved.

Under the conditions of scientific and technological progress we are presented with growing requirements. Computer technology must have a capacity larger by 2 to 3 orders of magnitude than that produced today. The "Impuls'" NPO also is working now to solve this problem.

The collective of the association does a variety of work with users, directed toward very rapid introduction of control computer complexes into operation and their very effective use. We have created a subdivision in which purchasers are extended methodical and practical aid.

Concern about tomorrow

We consider one of the most important factors in increasing the effectiveness of scientific and production work to be maximum automation of engineering labor both in the sphere of development and in the sphere of production on the basis of application of computer technology and a broad collection of plotters and graphic terminals. We also have problems which hinder us from advancing.

What is a "series-production plant" under our conditions? The quotation marks are no accident here. The plant's main task is not the output of product but the performance of functions of a unique polygon to accomplish rapid organization of series output of product by other plants of the sector. Our plant is developing a technology for the production of new articles, and their series production will be transferred later to other enterprises of the Ministry of Instrument-Making, Means of Automation and Control Systems of the USSR.

Thus the NPO plant appears in the complex role of an enterprise which creates the necessary prerequisites for the successful and highly efficient activity of other plants, at times on account of substantial worsening of the main technical and economic indicators of their work, and an effective system of planning which does not take such distinctive features of the plant into consideration sets it in clearly unequal conditions with production associations.

The situation can be intensified still more during the transition in planning with use of the indicator of the normative net production.

It is advisable to introduce corresponding corrections in the procedure for planning the indicators and the funds for economic stimulation for NPO plants. This applies above all to such indicators as the numbers of personnel, the wage fund, the standards of deductions for the economic incentive fund, etc. Corresponding changes should also be introduced in the system of comparative evaluation of the results of industrial activity of an association for a quarter, month or year.

The manufacture of control computer technology based on individual plans requires the organization of broad intrasector cooperation. It is impossible to increase the output of complexes complicated and varied in configuration according to the set of equipment without involving specialized enterprises.

It would appear that the most important problem ought to be solved very simply. In practice, however, our association, as a supplier of complexes based on individual plans, has encountered serious difficulties. Plans of intrasector cooperation are often violated, and direct delivery contracts concluded on the basis of them are not used.

Existing normative acts give us the right to transfer complete measure of responsibility to the true culprits. However, our measurements encounter an obstacle in the form of departmental arbitration. It is a matter of the existing procedure for examination of economic disagreements arising between enterprises and organizations which are a part of the system of a higher-standing organization. As a rule, the direct culprits receive amnesties, since it is disadvantageous to the Ministry of Instrument-Making, Means of Automation and Control Systems of the USSR to punish its subordinates.

A sharp need has developed to change the principle of subordination of the review of economic disagreements between enterprises which are part of the system of a higher-standing organization. Such a decision will contribute to a unique application of normative acts and increase the responsibility for suitable performance of economic contracts.

Some of our proposals

Under NPO conditions during organization of the series production of newly created computer complexes there is the possibility (which we also practice) of drawing in the scientific and technical personnel of the institute to accomplish together with plant services debugging and finishing work on articles from the first industrial lost--the organization of mixed collectives for a definite period.

By the same token, not only the process of the organization of new articles in production is greatly accelerated but the time required for the technical preparation and instruction of plant specialists is greatly reduced. However, in that case complications arise. Plant workers, working side by side with associates of the institute and accomplishing identical work with them, earn considerably more according to the wage system in effect at the plant. The institute does not have the resources to legally compensate its working associates for such interruptions in wages, and the plant, guided by the normative documents, cannot help them at all, as they are not its workers.

To eliminate such a dilemma, a portion of the resources of the material incentive fund created at the plant (from an amount exceeding the sum allocated to it for its own use in the given period) should be listed in the corresponding funds of the association for the purpose--for the material stimulation of workers of specific NPO subdivisions for work done in mixed collectives.

The solution of this problem without infringing upon the interests of the plant will permit removing the psychological barrier in mixed collectives.

The procedure for establishing the salaries of supervisory workers of the NPO administrative apparatus should also be simplified. In accordance with the statute on NPO's the association has no special administrative apparatus. By resolution of higher-standing organizations, for supervisory workers of the leading organization, that is, the institute, the establishment of salaries increased by 10-15 percent is allowed for performance of the additional functions.

However, the realization of that provision is so complicated that we have not succeeded in utilizing that possibility. I think the right to set higher salaries (within the limits of 15 percent) for supervisory workers of the apparatus must be presented to the general directors.

The question of personnel is a multifaceted one: users need specialists for the introduction and operation of computer technology. It is obvious that for the introduction and operation of computer equipment specialists should be trained for specific types of control of the complex. Specialized training centers which would have the possiblity of attracting and training highly qualified specialists are needed for the effective and timely (taking into consideration the renewal of equipment) instruction of personnel for users.

In spite of the prestige of our profession, a shortage of specialists is felt in the "Impuls'" NPO. The opening of a day department of an institute with a profile of the work of the "Impuls'" NPO would contribute to the solution of that question. Considerable preparations have been made for organization of a day department of the Khar'kov Institute of Radioelectronics. Unfortunately, the USSR Ministry of Instrument-Making, Means of Automation and Control Systems has not yet uttered the final word on this.
[86-2174]

2174
CSO: 1863

SUPPLEMENTATION OF NAIRI FAMILY OF COMPUTERS DISCUSSED

Moscow PRAVDA in Russian 11 Jan 81 p 3

[Article by M. Semerdzhyan, director of the Yerevan Scientific Research Institute of Mathematical Machines, deputy of the Armenian SSR Supreme Soviet]

[Text] The draft of the CPSU Central Committee to the 26th Party Congress, published for All-Union discussion, determines new large-scale problems in the field of science and acceleration of technical progress. The most important role in this matter belongs to further development of computer equipment and to a sharp increase of the efficiency of utilizing it.

The collective of the Yerevan Scientific Research Institute of Mathematical Machines made its own contribution to progress of computer technology. New-generation computers were at the center of the institute's attention. The first step in this field may be regarded as the appearance of the Nairi-4 computer, which served as the main base of the Nairi-4/ARM computer for construction of so-called automated operators' positions. Development of the new equipment denoted an important step in automation of planning and design work in a number of sectors of industry.

A highly productive model belonging to the unified computer system--the YeS-1045 computer--was also designed at our institute and turned over for serial production. It is being utilized efficiently at large computer centers and also in formation of sector ASU [Automated control system] and collective-use computer centers.

Development of the Nairi-4 and YeS-1045 made it necessary to organize a new subdivision at the institute, called upon to be involved in automated design of components, assemblies and devices of future computers using existing machines. Because of this, a large part of design documentation preparation is now carried out by using computers.

The collective has a good beginning for the 11th Five-Year Plan. Trends for development of new models of the Nairi family of computers and construction of problem-oriented multimachine and multiprocessor computer complexes with extensive use of sets of microprocessors on their basis have been determined.

Investigations have begun on a new model of the YeS EVM [Unified computer system] on a modern technical basis. This direction of research is in the channel of the problems formulated in the draft of the CPSU Central Committee in the field of computer technology: increasing the efficiency of ASU, development of computer networks, collective-use computer centers and also new computers intended for automation of planning and design work and control of production processes.

The course of development and prospects of mathematical machine building in the Armenian SSR are convincing: the republic must have a powerful production association interacting closely with scientific research institutes--the developer of hardware--during the 11th Five-Year Plan. It should have an SKB [Special design office] capable of continuously improving the produced computer equipment, continuously reducing the laboriousness of manufacture and of improving product quality. The periods of development of computer hardware are being reduced, their quality is being improved and cost is being reduced. The problem of training qualified personnel in electronics and computer technology also disturbs us. A shortage of them is felt in the republic. A radical solution of the problem would be organization of a specialized vuz at Yerevan--an institute of electronics based on the faculties of computer technology, cybernetics and radio engineering of the Yerevan Polytechnical Institute.

I suggest that the following be added to the draft of the Main Trends in the subsection "In the Armenian SSR" after the words "increase the fraction of the radio engineering and electronics industry": "Implement a complex program to expand work in the field of development and production of computer hardware."
[132-6521]

6521
CSO: 1863

INCREASING THE PRODUCTIVITY OF COMPUTERS

Vilnius SOVETSKAYA LITVA in Russian 16 Dec 80 p 2

[Article: "Computers Will Be More Productive"]

[Text] The state Emblem of Quality has been awarded to the complex of M-5100 computers, production of which was begun by the Vilnius Plant of Computing Machines imeni V. I. Leni

The new computer is considerably superior in its specifications to its predecessor. For example, it has twice the electronic memory and can perform considerably more operations per second. These properties permit extensive use of the M-5100 not only to process statistical and economic data but also for automatic management of production.

This is the third computer complex, serial production of which has been assimilated during the 10th Five-Year Plan at the head enterprise of the Production Association Sigma. They have all been marked with the pentagon of quality.

"During the next five-year plan," said the chief engineer of the association A. Drasutis, "we will begin production of a new-generation computer. Each of its many blocks will store almost as much information as one of the complexes now being produced."
[130-6521]

6521
CSO: 1863

YES-1035 COMPUTER AWARDED STATE EMBLEM OF QUALITY

Minsk SOVETSKAYA BELORUSSIYA in Russian 1 Jan 81 p 2

[Article by G. Kotov: "Computer Name-Day"]

[Excerpt] The YeS-1035 computer has been awarded the state Emblem of Quality. This report on New Year's Eve flew like lightning around the plants, shops and sections of the Minsk Production Association of Computer Equipment. The developers of modern computers truly rejoiced in the achieved labor victory. One of the most important conditions of the socialist pledges adopted in honor of the 26th CPSU Congress was fulfilled.

The honorary pentagon will be placed on machines produced in December of last year. It should be emphasized that the YeS-1035 computer will become the main serial machine on the plant conveyor during the 11th Five-Year Plan.

Here are the comments of the general director of the Minsk Production Association of Computer Equipment Ye. T. Borodin:

"A difficult and complex situation began three years ago--we began to develop a new, highly productive machine which was born at the NII EVM [Scientific Research Institute of Computers] located alongside the plant. What will the past years mean for the plant workers? There were many problems, but each time the alliance of scientists, plant designers and workers made it possible to resolve them successfully each time. As a result the country received modern computers which operate reliably at plants and in institutes and institutions, solving the most diverse problems. At the same time work was conducted to improve the technical level and quality of the product. There was a single desire: the "35s" should compete successfully with the best domestic and foreign counterparts. The desired goal was not reached initially. The first machines had a number of essential deficiencies. Specific measures were implemented to eliminate them. In short, there was active improvement of the computer during preparation for certification for the state emblem of quality.

Understandably, the quality of the produced product depends not only on technical problems but on a number of others as well. And the total of all the active measures undertaken yielded positive results. A total of 99.8 percent of YeS-1035 computers produced are now accepted upon first presentation.

Therefore, the new machines are confidently emerging onto the international trade market. YeS-1035 computers have already been delivered to Hungary, Poland, East Germany, Finland and Belgium.

Of course, the conscientious labor of thousands of workers and specialists made it possible to achieve success. Hundreds of workers hold the rank of excellence of quality. Let us take the adjustment shop where production of the computers is completed. This is a crucial stage which the collective of two adjustment sections provides. Each of them placed part of their soul into the common matter. Adjuster engineers S. I. Shinkevich, L. I. Trukhan, V. L. Petrov, L. I. Rusina, L. Ye. Ivanenko, S. Ye. Pozdnyakov, R. V. Mironchik and A. V. Puzdyrev gained special respect.
[132-6521]

6521
CSO: 1863

SERIAL PRODUCTION OF ISKRA-2240 COMPUTERS REPORTED

Moscow SOVETSKAYA ROSSIYA in Russian 7 Dec 80 p 2

[Article: "Computers are on the Conveyor"]

[Text] The collective of the Kursk Plant Schetmash has begun serial production of Iskra-2240 computers. They are designed to carry out a wide range of planning and economic, bookkeeping and other calculatios and analyses.

"There is the trend to bring electronics closer to the operator's position," says the chief engineer of the enterprise V. Shuteyev. "Therefore, minicomputers will become more common. One of them is the Iskra-2240. This keyboard machine weighs much less than the previous model and consumes considerably less electricity, althoughits 'operating' qualities were increased appreciably."

The collective of Schetmash is preparing to begin production of yet another innovation--the Iskra-226 computer--by the opening of the 26th Party Congress.
[130-6521]

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CSO: 1863

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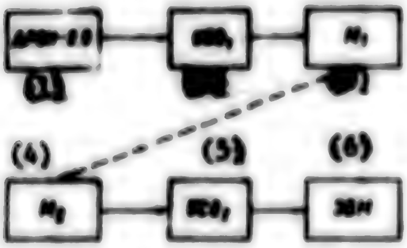
THE DRON-2.0 DIFFRACTOMETER AUTOMATION SUBSYSTEM

Kiev MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA in Russian No 4, Oct-Dec 80 pp 53-54 manuscript received 25 Feb 80

[Article by engineers P.Z. Aralbayev, A.K. Sevast'yanov and G.V. Vavilin]

[Text] An automation subsystem for the DRON-2.0 diffractometric installation has been developed in the Institute of Cybernetics of the Ukrainian Academy of Sciences, which makes it possible to boost the productivity of experiments in the structural X-ray analysis of samples, and expand the functional capabilities of the set-up. The subsystem incorporates the interfaces (see the Figure) to the test unit USO_1 and USO_2, as well as the "Yupiter-201-Stereo" home entertainment tape recorders M_1 and M_2. Used as the USO's [interfaces] are coupling devices designed around the system of hardware for interfacing computers to the SEKTOR units, a system which was developed in the Institute of Cybernetics of the Ukrainian Academy of Sciences [1, 2]. The USO was designed for feeding measurement data out and recording it on magnetic tape (ML); the data input from the magnetic tape to the computer (M-6000, M-4030); the readout of the current data on a digital meter and the expansion of the step range in the digital operational mode of the installation.



Block Diagram of the Subsystem

Key:
1. DRON-2.0 diffractometer;
2. Interface 1;
3. Tape recorder 1;
4. Tape recorder 2;
5. Interface 2;
6. Computer.

The following units are incorporated in USO_1: The USO--diffractometer interface, a timer, three measurement data input units and a data output unit for recording on magnetic tape; incorporated in USO_2 are the units for reading out the magnetic tape data, converting the series code to a parallel one and the USO--M-6000 computer interface.

The "Yupiter-201-Stereo" home entertainment type recorders are used without any modifications. They are designed for recording the measurement data and playing it back for input to the computer.

The Main Technical Characteristics

Word bit length	12
Method of magnetic recording	Dual frequency keying
Measurement data recording speed	4.76 cm/sec
Data playback speed	4.76, 9.5 and 19.05 cm/sec
Maximum data input speed into the computer	2,000 bit/sec
Data recording frequency	500 bit/sec
Number of magnetic tape tracks used	1
Record density	105 bit/cm
Maximum data storage capacity	5,400,000 bits

The subsystem functions as follows: During the experiment, the measurement data which characterizes the radiation intensity and the rotational angle of the sample, is fed using a parallel code of several pulse trains to USO_1, where it is converted to a series code and fed out for recording on the magnetic tape. Then the reel with the magnetic tape is transfered to the computer room, where using the second tape recording, operating in a playback mode, as well as USO_2, in which the series code is converted to a parallel code, the information is fed into the computer in tetrads. The data is recorded on the magnetic tapes at a speed of 4.76 cm/sec and played back at a speed of 19.5 cm/sec, something which produces a substantial savings in machine time.

The DRON-2.0 subsystem which has been developed makes it possible to expand the functional capabilities of the installation, specifically:

--Provide for the recording of the measurement data on magnetic tape in continuous and discrete modes in step with the experiment;

--Feed measurement data from the magnetic tapes into the computer;

--Provide for visual observation of the current data on the readout of the USO;

--Expand the step range in the discrete mode from 99,000 to 400,000;

--Curtail the average time for conducting an experiment when studying samples in a continuous mode from 4.5 to 1 hour by eliminating the time for preliminary data processing prior to feeding into the computer;

--Increase the operational convenience of the installation through the quiet recording on the magnetic tape and its repeated utilization.

Results of tests performed with one of these installations in the Institute of Electrical Welding of the Ukrainian Academy of Sciences have shown that the subsystem provides for a reliability in the data transmission from the installation to the M-6000 computer which is sufficient for the efficient performance . . . [article obviously incomplete due to typographical error at this point].

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[89-8225]

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CSO: 1863

NEW UNIFIED SYSTEM COMPUTER UNITS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan-Feb 81 pp 134-137

[Article by Engineer A. A. Shelikhov, NITsEVT]

[Text] YeS7903 Combined Punched Tape Input-Output Unit

The YeS7903 punched tape input-output unit may be connected to a Unified System computer, and it can support monopolar or multiplex operation. Data input requires standard paper tape (17.5 and 25.4 mm) of varying lengths: up to 10 meters without special attachments, and up to 300 meters with a special feed cassette. The read and output mode is turned on by an instruction code at the console of the unit operator. Data are punched out on paper tape, with complement to an even or odd of punches, or without complement. Data input proceeds with even parity check, with odd parity check, and without checks.

The unit possesses sources monitoring tape breakage, and exhaustion of tape supply. A portable engineer's console can be connected to the unit, with the purpose of seeking faults in both independent mode and when the unit operates connected to a computer channel.

Structurally, the YeS7903 unit is a typical pedestal with a FS-1501 photoelectric tape reader and a PL-150M tape punch on top, and an input-output mechanism control unit inside.

The control unit supports the following functions: reception of instructions from the computer channel and control of their execution, control of the mechanisms of the FS-1501 and PL-150M, odd and even parity checks of the transmission channel, transmission of information on the unit's current state and on its execution of instructions into the channel, control of tape breakage and exhaustion, and so on.

The YeS7903 unit has an independent power supply located inside the pedestal. The unit's electronic circuits are integrated.

Technical Characteristics

Input rate	1500 lines/sec
Output rate	150 lines/sec
Type paper tape	5-8 track
Information display method:	
in copy mode	any code
with transformation	KOI-7

Consumed power	0.8 kva
Overall dimensions	1200×670×1325 mm
Weight	250 kg

YeS4001 General-Purpose Channel

The YeS4001 general-purpose channel is a new second-generation development of the Unified System computer, and it performs the functions of an independent asynchronous input-output processor. The YeS4001 unit can handle four additional new instructions beyond those within the capacity of first-generation computer channels: "Begin Input-Output With Quick Deviation", "Free Input-Output", "Stop Unit", "Record Channel Identifier".

In order to permit organization of a virtual memory, indirect addressing has been introduced into the channel as a supplement to the address converters in the processor. These resources make it possible to control data exchange with nonadjacent pages of the main memory.

The channels foresee a possibility for built-in instruction repetition. This operation is performed without the participation of the central processor. Presence of channel state recorders in the channel makes it possible to correct computer operation in the case of errors with the appropriate programs.

Structurally the channel is a typical stand containing three block-multiplex channels, one byte-multiplex channel, and a power supply system (see photograph on second page of cover [not included in translation]). The block-multiplex channel has built-in control, and in block multiplexing mode the channel can simultaneously run up to 80 channel programs. The byte-multiplex channel is equipped with microprogram control. Microprograms are fed in from a YeS5009 console-type storage unit.

The unit's electronic circuitry consists of integral circuits and discrete components.

Technical Characteristics

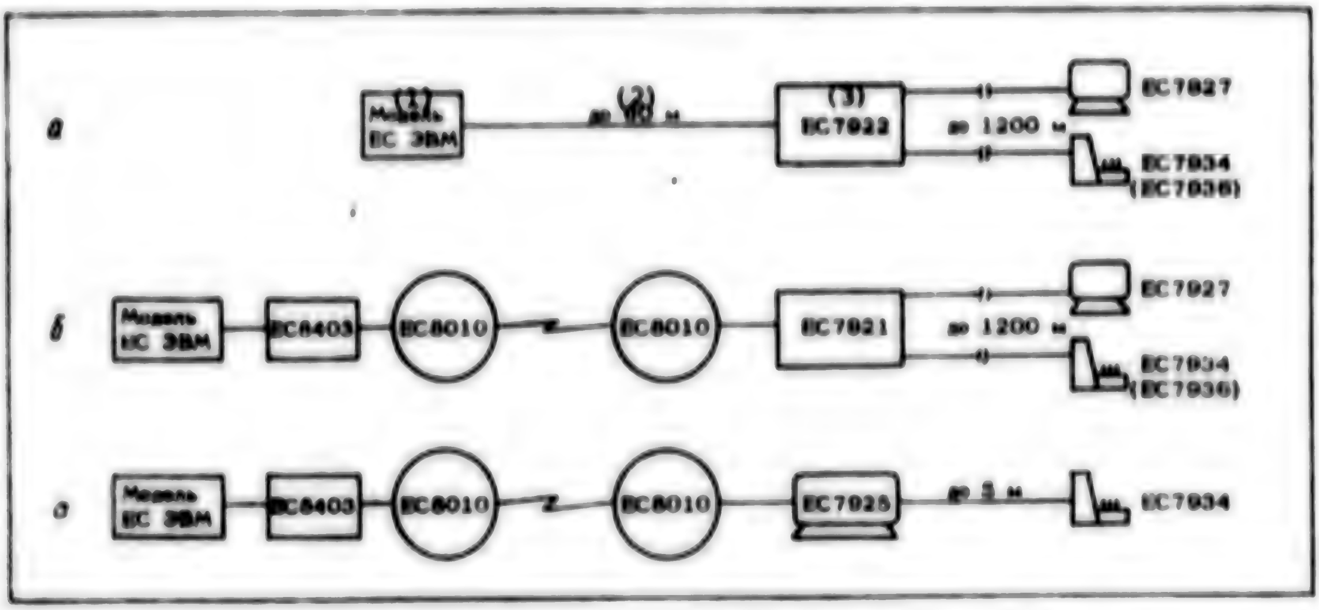
Block-multiplex channel	
Capacity	Up to 3M bytes/sec
Number of subchannels	80
Byte-multiplex channel	
Total channel capacity	1.5M bytes/sec
Number of selector subchannels	4
Selector subchannel capacity	500K bytes/sec
Number of multiplex subchannels	1
Multiplex subchannel capacity	100K bytes/sec
Consumed power	6.5 kva
Overall dimensions	860×2070×1600 mm
Weight	880 kg

The YeS7920 Alphanumerical Information Display System

The YeS7920 complex is a multiple-console system including an assortment of information input-output units connected to a central control unit. The YeS7920 information display system is intended for use by information-reference services and by data collection and preparation systems.

The YeS7920 system has a flexible configuration permitting the user to set up this complex in the most diverse ways for joint operation with a computer.

Three variants of the YeS7920 complex are distinguished in relation to the method of operator access to the computer: grouped local, grouped remote, and single remote.



Variants of the YeS7920 complex: *a*--grouped local ; *b*--grouped remote; *в*--single remote.

Key:

1. YeS computer model
2. Up to
3. YeS

A grouped local complex is intended for direct attachment to a multiplex, block-multiplex, or selector channel of a YeS7922 group control unit of a Unified System computer, and through it, to 32 YeS7927 display units and YeS7934 or YeS7936 printing units, in any combination.

A group remote complex is connected to the computer through reserved telephone communication lines by means of a YeS8403 data transmission multiplexer (outfitted with an SA-2 synchronous adapter) and YeS8010 modulator-demodulators. In this case a YeS7921 is used as the group control unit, permitting connection of up to 32 YeS7927 displays and YeS7934 (YeS7936) printing units, in any combination.

A single remote complex may be connected for operation with a Unified System computer by means of reserved telephone communication lines, a YeS8403 data transmission multiplexer (outfitted with an SA-2 synchronous adapter), and YeS8010 modulator-demodulators. A control unit is not required in this case, and a YeS7925 display and a YeS7934 printing unit are connected to the computer directly through the data transmission multiplexer.

Technical Characteristics

Data transmission rate	600, 1200, 2400, 4800 bytes/sec
Data transmission methods	Synchronous
Exchange mode	Semiduplex
Information exchange code	KOI-7
Rate of information exchange between group control unit and computer channel	Not less than 250K bytes/sec
Rate of information exchange between group control unit and peripheral displays	760-854K bytes/sec
Parameters of the peripheral units:	
Capacity of YeS7927 display	480 symbols (model 1) 1920 symbols (model 2)
Rate of data exchange with YeS7927 unit	600, 1200, 2400, 4800 bytes/sec
YeS7925 display capacity	480 symbols (model 1) 1920 symbols (model 2)
Rate of data exchange with YeS7925 unit	600, 1200, 2400, 4800, 9600 bytes/sec
Printing rate for YeS7934	40 symbol/sec
Number of copies	3
Number of symbols per line	132
Printing method	Tabular (7×9), pinpoint
Printing rate of YeS7936	66 symbols/sec
Number of copies	3
Number of symbols per line	132
Printing method	Tabular (7×9), pinpoint
Complex consumed power	Not more than 0.5 kva
Weight:	
YeS7121 (YeS7122) group control unit	200 kg
YeS7927 (YeS7925) display	25 kg
YeS7934 (YeS7936) printing unit	40 (100) kg
Space occupied	6-32 m^2 (depending on outfit)

YeS3206 Main Memory

The YeS3206 main memory has enjoyed use with YeS1045, YeS1052, and YeS1060 computers. Structurally the unit consists of a typical stand containing a control unit, a memory module, and a power supply system. The main memory is provided recording and reading protection. The removable YeS3941 memory module is a self-contained unit with a capacity of 64K bytes (660×419×97 mm), and it is intended for reception, storage, and output of binary information as part of the main memory. An M5BT-1-1K ferrite core is used as the memory cell (0.6×0.4×0.13 mm). The information access circuits are designed as a 2.5D system. Because the main memory is modular, the capacity of the YeS3206 unit can be increased to 1024K bytes by increasing the number of YeS3941 memory modules contained within its stand.

Technical Characteristics

Main memory stand capacity	1024K bytes
Information reading cycle	0.6 μsec
Information recording cycle	0.5 μsec
Access time	0.6 μsec
Word length	18 bytes
Consumed power	Not more than 10 kva
Overall dimensions	1400×800×1600 mm
Weight	1150 kg

YeS3263 Main Memory

The YeS3263 operational memory receives, stores, and transfers information as a component of the YeS1033 computer. Structurally the YeS3263 is a typical Unified System computer stand containing memory modules, control, addressing, and information units, and a power supply (see photograph on third page of cover [not included in translation]). The memory module consists of semiconductor memory cells. The main memory is typified by high resistance to interference, and reliable protection resources insure information read-out without distortion.

Use of integrated circuits as memory cells and in the electronic blocks has reduced electric power consumption by several orders of magnitude.

Technical Characteristics

Main memory capacity	256K with a 36 byte word length
Cycle time	1.5 μsec
Access time	0.8 μsec
Consumed power	1.6 kva
Overall dimensions	1200×750×1600 mm
Weight	500 kg

YeS3266 Main Memory

The YeS3266 main memory is a promising memory intended for operation together with high-productivity computers.

Structurally the YeS3266 main memory is a typical stand containing memory blocks consisting of semiconductor memory cells, and a power supply block.

The YeS3266 is designed in blocks and modules. A unit with a capacity of 8M bytes consists of four memory logic blocks of 2M bytes each (256K, with a cell word length of 72 bytes). Each memory logic block is a complete memory unit, and within the YeS3266 main memory it possesses an independent interface with the processor, thus insuring independent operation of identical blocks. Each memory logic block consists of four memory modules.

A memory module supports the following functions:

Reception of formed address and control signals from the local control block;

registration of a 72-bit word in accordance with the required address;

immediate-access storage of 64K 72-bit words;

output of a required 72-bit word into the processor.

The correctness of information storage and transmission is checked with a Hamming code; binary errors in the processor memory adapter are detected, and single errors are corrected.

The YeS3266 unit exhibits high resistance to interference.

Technical Characteristics

Capacity	8M bytes
Cycle time	Not more than 680 nanosec
Access time	Not more than 520 nanosec
Consumed power	Not more than 4 kva
Overall dimensions	1400×800×1600
Weight	Not more than 1000 kg

An Auxiliary Storage Complex: A YeS5025 Magnetic Tape Memory (NML) and a YeS5525 NML Control Unit

The YeS5025 magnetic tape memory is an inexpensive and modern computer auxiliary storage unit with all of the merits and technical potentials of units of this class that have presently been employed in the Unified Computer System: a multiple-roller magnetic tape drive, and block construction.

The parameters of the standard magnetic tape employed (12.7 mm) and the arrangement of information on it comply fully with recommendations of the ISO.

The main merits of the YeS5025 unit are:

use of two methods for recording and reproducing information: phasal coding (63 bytes/mm) and BVN-1 [not further identified] (32 bytes/mm)--without "0" reset and "1" inversion;

high structural compatibility with the YeS5017 basic memory and its modifications.

The YeS5525 NML control unit permits connection of up to eight YeS5025, YeS5012 (Bulgaria), YeS5017 (USSR, GDR), and YeS5019 (Poland) memories to a YeS computer, in any combination. Use of a single control unit to connect NML's, using both phasal information recording and BVN-1, creates certain conveniences for the user. The data transmission rate depends on recording density and advance rate of the magnetic tape, being 64, 126, and 189K bytes/sec.

The main purposes of the YeS5525 are:

receiving instructions from the computer channel, and executing them;

transmitting data between an NML and the computer channel;

checking the authenticity of transmitted and received data;

generating information describing the state of the unit and the conditions under which the last operation was completed.

Owing to automatic correction of single and group errors, the reliability of the read information rises significantly.

Structurally the YeS5525 unit is a typical YeS computer stand. The unit's electronic circuitry consists of integrated circuits and discrete components.

Technical Characteristics

Average access time	45 sec
Tape advance rate	2 meters/sec
Number of tracks	9
Tape rewind time (750 meters)	2 min
Consumed power:	
For the YeS5025 memory	2 kva
For the YeS5525 control unit	1 kva
Overall dimensions:	
YeS5025 memory	790×1600×750 mm
YeS5525 control unit	1200×750×1600 mm

YeS7038 Printing Unit

The YeS7038 unit prints out information from a Unified System computer in the form of numbers, written texts, tables, and graphs.

Line-by-line information printing and advance of paper punch tape (800-420 mm) are controlled by instructions from the computer channel. Lines of data to be printed are transmitted to the unit as individual bytes, and they are accumulated in a buffer memory. The data input rate is not critical, but the maximum transmission rate is 250K bytes/sec.

A steel tape containing up to 96 symbols is used as the type carrier. The printing mechanism permits the operator to adjust print clarity, paper tension, line shift relative to fixed format lines, and the moment of symbol printing with the purpose of achieving uniform printing in the entire cycle. Built-in monitoring resources keep track of paper supply, and they monitor paper breakage, paper shift resulting from programming error or a fault in the unit, the operating position of the type carrier, alignment of the typing ribbon, or its absence.

The new typing method and broad use of integrated circuits in the electronic blocks have made the YeS7038 a compact unit, and they have significantly improved its operational characteristics.

The appearance of the unit is shown on the third page of the cover [not included in translation].

Technical Characteristics

Printing rate:	
35 symbols per unit	1000 lines/min
96 symbols per unit	700 lines/min
Number of bits per line	32
Dimensions of printed symbols	2.3 1.4 mm
Line spacing	4.23 mm
Number of copies	Up to 5
Consumed power	1.5 kva
Overall dimensions	1370×852×1200 mm
Weight	400 kg

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15 VVV 3040, 15 ST 64x64-001 DISPLAY EQUIPMENT DESCRIBED

Moscow EKONOMICHESKAYA GAZETA in Russian No 47, 1980 p 23

[Text] 15 VVV 3040 Information Display Unit

Used as a microcomputer input/output peripheral unit and also used as an alphanumeric and graphic terminal, or separately. This unit makes possible a duplex mode of exchange with systems transmitting data by the serial asynchronous method through an S2 interface at speeds of from 50 to 9600 bits per second and through a telegraph interface (or separately) at speeds of from 50 to 2400 bits per second in KOI-7 or KOI-8 code. Provision is made for the capability of editing alphanumeric information (tabulation, shifts, erasing, protection of memory zones, etc.), addressing and read-in, linear interpolation, transference of a graphic sign across the screen's field, etc., when working with graphic information.

Technical characteristics: character representation format--5 X 7 matrix points; number of characters and symbols which can be represented on the screen (38 lines of 80 symbols each)--3040; size of a character: capital letter--2.5 X 3.5 mm, lower-case letter--2.5 X 2.5 mm; resolution--two elements per millimeter; size of working field--256 X 256 mm; angle of view--not less than ± 45 degrees; brightness of image--100 cd/m^2; contrast not less than 60 percent; color of image--orange; image scintillation--absent; set of symbols able to be displayed--32; powered by a 220 VAC 50 Hz line; power requirement--300 W; overall dimensions: display--620 X X 460 X 388 mm, control unit--450 X 400 X 130 mm; weight--57 kg; duration of trouble-free operation--800 h; service life--eight years.

The unit comes as a package consisting of an "Elektronika" 15 IPK 12 X 12-002 controller (one each) and an "Elektronika" 15 IG 256 X 256-005 graphic display (one each), which can also be supplied and used as independent items.

Price limit of combination--9000 rubles.

15 ST 64x64-001 Indicator Module

Designed for constructing collective-use alphanumeric and graphic information display units. Direct-current gas-discharge indicator panels (GIP 32 X 32) are used as indication elements. On the face side of a module are four gas-discharge panels forming a light field measuring 386 X 386 mm with a number of indication elements of

4096 (64 lines and 64 columns). Inside the case is a circuit for controlling the four GIP's [gas-discharge indicator panels], consisting of eight printed circuit modules of the same type with memory and control elements. A two-coordinate access mode is used to control the indication elements of the GIP's. External connections are accomplished by means of connectors which have been provided. The design of the module makes it possible to construct an information display unit without loss of the spacing between indication elements of neighboring modules, which makes it possible to display various symbolic and graphic information within the limits of the resolution.

Technical characteristics: overall dimensions of module--386 X 386 X 260 mm; weight not greater than 12 kg; maximum power requirement from power supplies--not greater than 70 W; color of glow of indication elements--green; brightness--100 cd/m^2; reading angle--± 45 degrees; size of indication element--3 X 3 mm; distance between indication elements--6 mm.

Wholesale price of module--2000 rubles.

To obtain additional information apply to the following address: 287100, Vinnitsa, ul. Karla Marksa, 40, TsKBIT; telephone 3-38-52, 3-37-64.
[70-8831]

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PROGRAMMING P-TECHNOLOGY AND ITS BESM-6, YeS, AND SM COMPUTER SUPPORT

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan-Feb 80 pp 138-139

[Article by V. N. Tsoy, Scientific Adviser, USSR State Committee for Science and Technology]

[Text] An all-union conference-seminar entitled "Programming P-Technology and its BESM-6, YeS, and SM Computer Support", organized by the USSR State Committee for Science and Technology and the Ukrainian SSR Academy of Sciences Institute of Cybernetics, was held between 24 and 30 August 1980 in the town of Zhukin, near Kiev, at the School of Physicomathematics of the Ukrainian SSR Academy of Sciences Institute of Cybernetics. Its participants included 110 representatives from 67 scientific and planning organizations in different cities of the country. The main goal of the conference-seminar was to exchange experience in the use of P-technology and to write up a coordinated program of its further development.

Programming P-technology supported by the basic domestic computers through special RTK [not further identified] hardware complexes, is one of the modern technologies used in the planning and development of complex program systems of various purposes. At the present time RTK complexes are enjoying effective use in more than 50 organizations. Positive experience in the use of P-technology to solve ASU [automated control system] problems, to organize SAPR's [automatic computation systems], IPS's [information retrieval systems], program packages, translation systems, and various hardware systems, and to expand programming languages and impart particular problem orientations to them, has been accumulated. P-technology is especially effective in the development of language subsystems, in the processing of large flows of symbolic information and information having a complex logical structure, and in the design of input-output systems (to include in work with displays and input-output units for graphical information).

The conference-seminar was opened by Doctor of Physicomathematical Sciences I. V. Bel'bitskiy, who acquainted the participants with the basic conceptions of P-technology and with the present state of hardware support to P-technology, as well as the prospects for its development.

Among reports by the developers of RTK complexes, the following elicited the greatest interest: "RTK OS YeS Programming Languages" (V. N. Khodakovskiy--Kiev); "The Possibilities of the Tabular Memory of an OS YeS RTK" (Ye. V. Chesnokov--Kiev); "A Display Image Switching Program and an RTK Teaching Information Bank" (S. A. Ternau and M. G. Shchedrova--Tallin); "The STELZ YeS EVM Metasystem" (A. L. Kovalev--Kiev); "Design Conceptions for an RTK Monitoring-Servicing Stand" (Ye. V. Silayev and O. V. Malyshev--Kiev); "The RTK DOS YeS Programmer's Technological Complex" (I. Ye. Netesin--Kiev); "The RTK BESM-6 Technological Complex and the Experience of Its Use in the Development of the SINTERM ASPP" (V. V. Makarov and L. I. Sholmov--Kiev); "The RTK DOS SM EVM Technological Complex" (A. A. Taranenko--Kiev); "The Dialog Text Editor in the RTK SM EVM" (A. B. Romanovskiy--Kiev).

The statements of system users were devoted to a broad range of issues associated with the use of P-technology in the development of ASU's, IPS's, data storage and processing systems, and application program packages. The most interesting included "Use of the RTK OS YeS in Development of an ASU" (S. S. Protsenko--Kiev), "Analysis of the Experience of Using P-Technology to Design an ASU ICS" (S. T. Rodionov--Kalinin); "Use of P-Technology to Design Program Generators" (V. A. Bobrovnikov, V. N. Afanas'yeva--Ivanovo); "Some Unique Features of the Language of a Problem-Oriented P-Computer and Its Translator" (V. N. Gurin--Groznyy); "Use of P-Technology in a Dialog System for Automatic Input of Graphical Information" (B. G. Osnach--Kiev); "Mobile Resident Software for a Microcomputer Servicing a P-Computer" (I. D. Butomo, V. P. Kotlyarov, A. V. Samochadin--Leningrad); "Expansion of Programming Systems Employing P-Technology by the Edition of Teaching Resources" (A. N. Kostovoskiy and I. I. Kul'chitskiy--L'vov); "Effect of P-Technology on SM EVM Programming" (I. V. Martynova--Moscow).

Most of the speakers noted a significant increase in programmer labor productivity (by a factor of 2-8 in comparison with traditional programming methods), a decrease in the complexity and laboriousness of creating complex systems (for example when designing translators and master programs), simplification of program tracking and change, and the possibility for more-effective division of labor within a collective of developers.

At the same time, certain difficulties were noted in the use of P-technology, elicited by a lack of good-quality documentation, and methodological and educational aids.

In the course of its proceedings, the conference-seminar developed a new form of cooperation between P-technology users and developers--permanent working groups of users specializing in different directions of P-technology application. Six working groups were organized, specializing in the following problems:

ASU (led by G. P. Mandrusova, Kiev);

SAPR (V. N. Nuzhdin, Ivanovo);

data processing systems (A. P. Semenov, Moscow);

software for microcomputers and microprocessors (V. P. Kotlyarov, Leningrad);

program debugging (A. V. Malyshev, Kiev);

use of the RTK BESM-6 (S. T. Rodionov, Kalinin).

Two regional groups were also created:

Moscow (T. N. Tikhomirova, Moscow);

Ural (Yu. D. Kolyakin, Magnitogorsk).

The tasks of the organized working groupsinclude improving the forms of communication between users and developers of P-technology, preparation of methodological materials, experience exchange, and participation, together with developers, in cooperative efforts to develop RTK complexes and establish their problem orientation.

A resolution adopted by the participants of the conference-seminar stated the suitability of including RTK complexes in the composition of the systems software of series-produced domestic computers, and the need for organized training of programming specialists for RTK complexes.

Noting the productivity of such meetings, the participants of the conference-seminar voted in favor of holding them regularly.

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MULTIMICROPROCESSOR ARCHITECTURE OF COMPUTER SYSTEMS PERMITTING DIRECT INTERPRETATION OF HIGH-LEVEL LANGUAGES

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan-Feb 81 pp 32-36

[Article by Doctor of Technical Sciences K. L. Boyanov, Bulgarian Academy of Sciences IMM, and Candidate of Technical Sciences V. S. Kisimov, Bulgarian Economics Institute]

[Excerpts] Introduction: Computer systems permitting direct interpretation of high-level languages have been around since 1965. They were initially created for microprogram computers which emulated the operators of a high-level language, for example FORTRAN, COBOL, ALGOL, SNOBOL, APL, and others. Because in these cases the languages are interpreted without translation, they are called direct-interpretation high-level languages (YaVUNI). There is another principle of designing computer systems using YaVUNI--that of employing multimicroprocessor architecture.

It should be noted that when we employ the first principle, we organize the hierarchical structure of microprocessors and isolate main and subordinate microprocessors. The main microprocessors are used to control the system while the subordinate ones support the function of language operators. The second approach presupposes the existence, within the system, of a set of microprocessors, the links between which and the functions of which are determined by a program in relation to each concrete job. The program for each job consists of two parts, with the first programming the system's organization and the second containing programs for solution of problems on the basis of the organization already created. In this case main and subordinated microprocessors are isolated once again as a result of organization programming.

Both principles presuppose that all microprocessors cannot be used simultaneously, since as long as microprocessors of a higher level are working, the rest must wait their turn, and vice versa. Computer systems with YaVUNI possess a number of advantages:

lower programming time;

simpler program debugging;

faster documentation of program end products;

achievement of significant universality of program products created by different developers;

elimination of the need for professional systems programmers;

better user computer access;

one high-level language operator offers greater possibilities for desynchronizing the computation process in the computer than does a single instruction in a language of lower level. Therefore by using YaVUNI, we can achieve higher speed for the computer system.

This article suggests a new approach to designing the multimicroprocessor architecture of computer systems with YaVUNI with the help of pipeline organization, and it introduces the concept of a "constructive unit with microprocessor organization" (KEMPO). A KEMPO consists of a microcomputer (in one housing) and components providing communication with other KEMPO's or with a microprocessor, a working memory and a program memory, and components providing communication with other KEMPO's.

Pipeline organization at the basis of this approach experiences the following changes:

Each execution block of a pipeline organization represents a KEMPO, which may perform an elementary data processing action--that is, the same KEMPO may perform different actions with different YaVUNI operators;

there is a buffer between two neighboring KEMPO's for the transfer of intermediate results.

The proposed architecture has some unique features. First, the YaVUNI is not given in fixed form in each concrete computer system, and it may be changed in the course of operation. In this case one system may concurrently process several programs written in different YaVUNI.

Second, the user may change the format of the data during the time of the system's operation.

Third, there is a dynamic interrupt system permitting change, in the course of operation, of the priority for receiving and processing interrupt requests, and of the algorithm for processing the interruptions themselves. In this case one system may simultaneously process several programs employing different interrupt systems.

Results: Two processors were planned on the basis of the proposed architecture. The first design consisted of six Motorola 6800 microprocessors, and the second was based on 11 Itnel-3000 microprocessors. A sample YaVUNI operating on an arithmetic basis with a fixed decimal point and representing a version of PL/1 was selected.

The designed processors were compared with YeS computer, IBM/360, and IBM/370 processors; this required computation of the polynomials, list retrieval, and matrix multiplication. The comparison showed that for the examples selected, the first processor was about 1.5 times faster than the YeS1020, and the second was about 1.3 times faster than the IBM/370, model 155.

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APPLICATIONS

THE RESULTS FOR THE 10TH FIVE-YEAR PLAN IN THE CREATION AND USE OF COMPUTER TECHNOLOGY

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan-Feb 81 pp 3-4

[Editorial]

[Text] One more five-year plan for development of the Soviet Union's national economy has now become a part of its glorious history. Implementing the economic strategy worked out by the 24th and 25th CPSU congresses under the tested leadership of the Leninist party, in 1976-1980 the Soviet people achieved further successes in creating the material-technical base of communism and in raising the welfare of the Soviet people.

In comparison with the Ninth Five-Year Plan, national income increased by 400 billion rubles, with four-fifths of this income being utilized directly in public consumption and in residential and cultural construction. Significant growth was achieved in the productive and scientific-technical potential of all sectors of the economy. The defense capabilities of the Soviet state are being maintained at the required level. The rate of scientific-technical progress increased, the scale at which new equipment is introduced into the national economy grew, and the technical level of production rose. Soviet science made a great contribution to these successes.

Significant successes were attained during the past five-year plan in one of the main directions of the modern scientific-technical revolution--creation and effective use of computer technology in the national economy.

The procedures used in building large integrated circuits were noticeably improved on the basis of the achievements of physics, chemistry, and other natural and technical sciences; this made it possible to create and begin mass production of new models of general-purpose control computers, computer complexes, peripheral equipment, and information recording and transmitting devices characterized by higher speed and reliability. We began production of microprocessors and microcomputers intended to be used in highly productive machines and production equipment outfitted with built-in automated control systems, and their broad use has been initiated.

Creation of software packages for Unified System computers was finished, and packages broadening the possibilities of operational systems were introduced. Operational systems were created for the SM-1, SM-2, SM-3, and SM-4, and for multiple-machine complexes on their basis. As a rule operational systems are now delivered to users together with computers. The state bank of algorithms and programs was significantly enlarged with the addition of packages of applied programs intended for creation and management of data banks, for the modeling and analysis of systems and processes, for solution of problems in mathematical physics, for use of the numerical methods of computer mathematics, and for program development and debugging (PRIZ, RTK, and TKP production complexes).

This created the foundation for successful completion of the task posed by the 25th CPSU Congress--accelerated development and introduction of automated systems at all levels of control with the goal of creating, on this basis, a national automated system for the collection and processing of information to support accounting, planning, and control of the national economy. By the end of the 10th Five-Year Plan about 5,000 automated control systems of various levels and of different problem orientations were operating in the country, to include about 1,700 ASUTP's [not further identified] and over 2,300 enterprise and association ASU's [automated control systems]. Almost half of all industrial production in the USSR is now proceeding at enterprises and in associations outfitted with ASU's.

The effort to create and introduce branch ASU's into all union and union-republic ministries and departments has basically been finished. Broad use was made of typical planning concepts and programs, which significantly reduce the outlays (by an average of 30 percent) and the time to develop and introduce the ASU's, and it laid the foundation for their organizational unity. Extensive work was initiated to create territorial ASU's--republic, oblast, and city ASU's.

Much work was done in the past five-year plan to develop and introduce automated control systems for scientific research (ASNI) and automated planning systems (SAPR) that significantly accelerate the planning of technologically new facilities (by 1.5-2 times), improve their technical-economic characteristics (by 20-30 percent), and raise labor productivity in planning and design organizations (by 30-50 percent).

Several new, so-called production organization ASU's, which permit joint operation of ASUP's [automated control systems for enterprises] and ASUTP's have been created and placed into experimental operation.

In compliance with decisions of the 25th CPSU Congress, much preparatory work was done in 1976-1980 for a transition to collective forms of computer use. Six VTsKP's [time-sharing computer centers] (in Riga, Tallin, Tomsk, Tula, Minsk, and Leningrad) service more than 280 subscribers. The engineering plan for the State Network of Computer Centers and a standard work plan for the VTsKP were developed and approved by directive organs.

Fifteen unified document systems and 26 all-union classification systems for technical-economic information were written and approved with the goal of insuring a unified technical policy in the use of computer technology. The corresponding organizational and procedural materials associated with control over the introduction of these documents were approved as well.

We should note, however, that there were delays in automating control of production processes in the 10th Five-Year Plan due to a number of unsolved problems. Thus the national economy's demand for programming resources is still not being satisfied in terms of either the assortment or the quality of these resources. Modern computer applications such as remote data processing, dialog systems, time sharing systems, real time systems, and systems for organizing and managing data banks did not enjoy adequate development.

Because of a shortage of technical resources and production equipment, the labor productivity of applied programmers remains low, and the programs themselves are not yet being produced on an industrial basis. There is an unjustified gap between the writing of programs and organization of their delivery and follow-up. Standardization efforts in programming are proceeding too slowly, falling behind the practical and research needs in this area.

Most organizations of the state bank of algorithms and programs are limiting their activities mainly to information handling, which is clearly insufficient. The quality of programs and documents received from the bank is unsatisfactory in a number of cases, and the scale of services associated with program introduction and follow-up is limited.

The orders of users for computer technical maintenance and specialist training are far from fully satisfied.

The design and production base supporting the development and production of specialized instruments and automated resources in small series is falling behind the requirements of an ASUTP, owing to which ASUTP's have either not been created in general in a number of industrial sectors (paper, light), or they have been created in abbreviated form. Difficulties in supplying peripheral devices and cable products have not been fully eliminated.

All of these problems must be solved in the near future; this will create the necessary prerequisites for successful implementation of the grandiose program of raising the effectiveness with which computers are used in the national economy, a program which will be approved by the 26th CPSU Congress.

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COMPUTER NETWORK TESTING AREA RELATED

Riga SOVETSKAYA LATVIYA in Russian 14 Jan 81 p 4

[Article: "Computer Network Testing Area"]

[Text] Computers will be able to have access to each other in the future similar to the way in which users of telephone networks conduct a conversation. Computer networks are now being developed which encompass the entire country. The first experimental unit of this branched system has become the Kiev-Moscow-Riga triangle. Computers installed at the All-Union Scientific Research Institute of Problems of Organization and Management of the USSR State Committee for Science and Technology, at the Institute of Engineering Cybernetics, Ukrainian SSR Academy of Sciences and at the Institute of Electronics and Computer Equipment, Latvian SSR Academy of Sciences, have begun direct interaction. They have been permanently linked directly over telephone channels.

Commenting on this even, the chairman of the Committee of the USSR Academy of Sciences on Collective-Use Computer Centers and Computer Networks, Vice-President of the Latvian SSR Academy of Sciences E. A. Yakubaytis related the following:

The development of computer networks has been named among the most important scientific problems of the 11th Five-Year Plan and the period up to 1990 in the draft of the CPSU Central Committee to the 26th Party Congress. Hardware and software required to organize these networks will be developed in the created experimental test area. Machines separated by a considerable distance, but operating in a unified complex, will permit testing of switching terminals and other types of apparatus. This is an important step in implementing the grandiose plan.

We are talking about a qualitatively new principle of computer application in management of the national economy. Available programs will become common property: any of them can be called up within seconds. The computer networks will provide efficient use of the entire machine stock and operational exchange of data which are stored in information banks of institutions, scientific institutes and enterprises of various cities. Incidentally, users that do not have their own computers at their disposal will also be able to obtain the required information by being connected to the network through television sets, teletypes and even electric typewriters.

This is a real prospect. The collectives of many academic and sector institutes have combined their efforts to solve the problems related to it.
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NEED FOR COMPUTERS BY PLANTS DISCUSSED

Tallinn SOVETSKAYA ESTONIYA in Russian 13 Feb 81 p 2

[Article by I. Gudim, head of Operational Dispatcher Department, Republic Collective-Use Computer Center, Estonian SSR Central Statistical Administration: "Does a Plant Need Its Own Computer?"]

> [Text] Increase the quality and efficiency of management. Actively disseminate efficient work procedures, develop automated planning, accounting and management systems and utilize computer technology more fully." (From the draft of the Main Trends)

The number of computers in the republic doubled during the 10th Five-Year Plan, while the number of computer centers (VTs) increased by 22 newly organized centers, while the structure of territorial distribution remained unchanged: most are concentrated in Tallinn. In this case the average daily computer load during the 10th Five-Year Plan increased by only 0.4 hours compared to the Ninth Five-Year Plan and lags behind the minimum normative load for installed machines by 5.5 hours. This is mainly due to failure to adhere to the elementary rule: "Before acquiring a computer, think whether it is necessary and whether you can fully load it? Would it not be more advantageous to lease the services of another VTs?" and also by the organization of new local low-capacity VTs, the absence of adequate organizational work in training for computer acceptance: the personnel, number of problems, software and sometimes even rooms, as it turned out, were not prepared beforehand. One can cite sufficient examples when VTs are created and computers are acquired without sufficient organizational and economic justification, which force one to think that the actual basis is ideas of prestige by some managers to have their "own" computer and thus to prove that they are managers at the modern level.

I shall cite only two examples, the "more recent" ones: the Association Norma acquired an imported computer, but the programs had not been prepared and the machine was not used for a long time. The association RET recently received a computer which could not support the needs of the created ASU [Automated control system] and the cost of this machine was more than 400,000 rubles without additional devices. The "grounds" for acquisition of a computer are simple: the computers at most plants of the sector were bought so as not to "lag behind." Both associations utilized the services of the collective-use VTs, but made a step backward instead of developing this advanced system.

Retention of these tendencies does not permit a reduction of expenditures for maintenance of management apparatus and elimination of surplus and duplicate sections.

In fact, the number of administration and management apparatus of the VTs increased in the republic by 127 persons during the 10th Five-Year Plan, that is, the most highly qualified specialists in operation and maintenance of computers frequently changed their occupation and became administrators of the newly created computer centers. Such scarce programmer personnel began to design problems already introduced at other VTs and the level of their work is undoubtedly lower than that in large collectives. Capital investments are inevitably dispersed with creation of local VTs.

The time has come to eliminate agency obstacles in organization of using the most complex and expensive computer equipment and of creating conditions for more complete loading of it.

Specifically, it has been proposed that a computer be acquired for this purpose and that new computer centers be organized only with the sanction of the USSR State Committee for Science and Technology and the corresponding collective-use computer centers in their zones of operation. In fact, a second unit of the Tallinn VTsKP [Collective-use computer center] is now being designed. Installation of a powerful computer capable of operating in the time-sharing mode in complex with the already available computers will make it possible to replace most of the computers existing in the city. Naturally, the capital expenditures and operating expenses will be incomparably less than the expenditures for development and operation of low-capacity local computer centers.
[130-6521]

6521
CSO: 1863

COMPUTER USE ON EARTH AND IN SPACE DISCUSSED

Kiev PRAVDA UKRAINY in Russian 23 Dec 80 p 3

[Article by Academician V. Glushkov, vice president of the Ukrainian SSR Academy of Sciences, director of Institute of Cybernetics, Ukrainian SSR Academy of Sciences: "Computers on the Earth and in Space"]

[Text] Reading the draft of the Main Trends, one is again filled with the importance of problems of cybernetics, computer equipment and ASU [Automated control system].

The coming five-year plan is a further development and improvement of the unified series of standardized computers of the YeS EVM [Unified computer system] developed within CEMA. We are continuing work on both small and superlarge computers of the El'brus type, whose speed comprises 100 million operations per second--approximately 100-fold higher than in those now produced.

Innovation is seen in each scientific laboratory. Systems are being developed for automation of current technology for manufacture of integrated circuits for computers, which permits a significant improvement of quality. The so-called component technique in which the working tool in development of integrated circuits is the electron beam is in this approach. The "stuffing" of an entire computer is placed in a small crystalline chip of silicon one square centimeter in area.

An increase of ASU efficiency concerns us. There are thousands of ASU in the country. Combining the systems into integrated ASU will result in a sharp jump in effectiveness of control.

New steps must be taken toward "paperless control." After all, for the time being there are rather many computers alongside the machines who are essentially involved in punching holes in punch cards and as they say, "are shoveling fuel with a spade" --routine portions of information. This greatly reduces ASU efficiency. Qualitatively new systems of paperless control will permit complete automation of the entire path of information from the operators' positions to the computer.

We have many operating computer centers (VTs) with terminal systems--devices which permit computer access to remote users. The matter is proceeding toward joining of computer centers. At the beginning of December the interagency committee accepted the first unit of the RAS (republic ASU of the Ukrainian SSR), including the three-terminal network of computer centers of Ukrainian SSR Gosplan, Ukrainian

SSR Gossnab and Ukrainian SSR TsSU [Central Statistical Administration]. We will soon turn over an experimental zone of the GSVTs--State Network of Computer Centers.

The GSVTs will become the technical basis of a general state automated information gathering and processing system for accounting, planning and management (I discussed the tasks of this system, developed according to the decisions of the 25th CPSU Congress, in the interview "OGAS [Statewide Automated System]--a requirement of time," published in PRAVDA UKRAINY on 4 January 1979.

Since further realization of OGAS should be continued during subsequent five-year plans, the continuity and intensification of this work must certainly be ensured, with regard to which I propose that one of the paragraphs of section VII of the draft of the Main Trends be supplemented, having outlined in this edition: "Increase the quality and efficiency of management labor. Disseminate more actively efficient work procedures, develop automated planning, accounting and management systems, utilize more completely computer equipment and continue and intensify work to develop a statewide automated information gathering and processing system for accounting, planning and control (OGAS)."

Much remains to be done. At the present time a large number of computer centers are operating in a dispersed fashion. They have no unified manager--an agency which would take matters into its own hands. And without this we are unable to achieve the anticipated effect from numerous computer centers.

There is no doubt that the time has come for urgent creation of a ministry, committee or other unified statewide body which would manage the operation of all VTs systems and computer networks and would be totally responsible for this unusually important national economic problem. In this regard we suggest that the paragraph in section III of the draft of the Main Trends, be supplemented with an epigraph of this article. After the words "increase the efficiency of automated control systems and development of collective-use centers" and: "development and organizational formulation of the information processing sector in the country, including formation of a unified statewide body for management of this sector."

It is provided in section III of the draft of the Main Trends, on the basis of the advances of science and technology, that production and extensive use of automatic manipulators (industrial robots) built into automatic control systems using microprocessors and minicomputers be developed and ensured. In this regard, along with expansion of production of current first-generation industrial robots, it also remains to develop more improved robots which could be easily and quickly restructured. Microelectronics will help in this. It led to a reduction of computer dimensions and a reduction of their cost and energy consumption. Modern miniature computer equipment can be built in, let us say, not only in machine tools with numerical program control, but in comparatively inexpensive instruments and devices (for example, in motor vehicle engines). The field of automation is expanded sharply as a result. As many devices as possible even of medium complexity (spectrometers, rangefinders, chemical analyzers and so on) should be equipped with built-in minicomputers and microprocessors, which significantly increases the capabilities of scientific research, medical and other apparatus.

And since approximately 200,000 various production processes require automation in the future, it is understandable that cybernetics specialists themselves cannot but help comprehend the incomprehensible and that the effectiveness of realizing built-in automatic control systems will depend on development of this matter directly by the designers of various types of equipment and technologies. Therefore, goal-oriented training of them should be provided in section VIII of the draft of the Main Trends--where problems in the field of education and measures to improve the quality of training specialists and to improve their utilization in the national economy are discussed.

Various types of computer and control equipment now play an enormous role not only in different terrestrial sectors of the national economy, but in space as well. We have all seen several times this equipment in operation on our television screen -- both at the Flight Control Center and on board spacecraft and orbital stations. An important achievement of Soviet science and technology was the new on-board computer complex which passed strict exams three times during 1980--on the unmanned Soyuz-T and on the manned transport spacecraft Soyuz-T-2 and Soyuz-T-3. This universal computer complex with large memory replaced a number of specialized computers. It operated without error both in the automatic and in the semiautomatic modes and displayed wide capabilities, enviable independence in decision-making and high reliability and excellent speed. This on-board complex also received high marks from the crews of test cosmonauts and specialists of TsUP [Flight Control Center].

These and more improved complexes will also assist in further study and development of space in the interests of developing science, technology and the national economy planned by the draft of the Main Trends. Moreover, there will be a place for this computer and control equipment both on board spacecraft and orbital stations and on earth as well.
[132-6521]

6521
CSO: 1863

DEVELOPMENT OF UNIFIED ALL-UNION AUTOMATED INFORMATION PROCESSING SYSTEM DISCUSSED

Moscow PRAVDA in Russian 23 Feb 81 p 4

[Article by delegate to the 26th CPSU Congress, Deputy Chairman of the Ukrainian SSR Council of Ministers and Chairman of Ukrainian SSR Gosplan V. Masol]

[Excerpts] Of course, one still cannot say that the main problems of development and efficient use of ASPR [Automated control system for planning calculations] in the republic have already been resolved. Only the first step of its development has been taken and much still remains to be done. It is primarily necessary to intensify the systems aspect in development of ASPR. Therefore, we plan to develop a "systems nucleus" of ASPR of the republic Gosplan--a so-called "central problems complex." It will combine the calculations of the balance sheets of the national economy, labor resources and production capacities into a complete unified system based on the use of planning norms and will make it possible to better combine territorial and sector sections of the plan.

This is far from a simple task: it requires further improvement of the technology and organization of planning and direct contact of Gosplan specialists with computers in the operator mode. Development of dialogue systems of solving planning and economic problems based on direct access of planners to computers with utilization of remote data processing equipment has now begun. Scientists of the Institute of Cybernetics, Ukrainian SSR Academy of Sciences, are rendering important assistance in development of these systems.

Unfortunately, there are still difficulties in equipping ASPR with remote data processing devices. The minicomputers now produced still do not fully meet modern requirements on terminal and computer devices in creating an automated planner-operator's position. The problem of developing the production of peripheral equipment of computer complexes and of the corresponding software at advanced rates has been posed in this regard as very timely in the draft of the CPSU Central Committee to the 26th Party Congress.

An important task is to intensify the contacts of ASPR with other ASU [Automated control system] within the republic automated control system. A network of computer centers linked by communications channels has already been created in the Ukraine. ASPR are being developed at the level of oblasts and cities from standard planning decisions. It is expected that the effect of planning and control on the final results of social production will increase significantly after they are completed. In the future this will make it possible to more actively introduce modern methods of production and labor organization and to provide complex planning, financing and stimulation of scientific and technical progress.
[132-6521]

6521
CSO: 1863

INCREASE IN EFFICIENCY OF ASU CALLED FOR

Moscow RABOCHAYA GAZETA in Russian 25 Jan 81 p 2

[Article by V. Gulevatyy, candidate of economic sciences, senior scientific worker of the Laboratory of Economics and Organization of Machine Informatics, Institute of Cybernetics, Ukrainian SSR Academy of Sciences: "How to Increase the Efficiency of ASU"]

[Text] Special attention is being devoted during the 11th Five-Year Plan, as during the 10th Five-Year Plan, to efficient use of material, labor and financial resources and to an increase of labor productivity on the basis of qualitative improvement of social production management systems.

A significant position is being allocated in solution of this problem during the coming five-year plan to automation of various processes of management of the national economy and primarily to development of automated control systems (ASU). ASU have become one of the main trends of scientific and technical progress and an important factor for increasing the efficiency of social production.

The significant volume of work on automation of control, carried out during the 9th and 10th Five-Year Plans, provided a powerful technical base for processing of planning and management information. More than 4,500 systems of various designation are operating in the country and they total approximately 800 systems in the Ukraine. Investigations on extensive utilization of ASU will be continued during the 11th Five-Year Plan and, as noted in the draft of the Main Trends, important significance is being given to increasing the efficiency of automated control systems and to development of computer networks and collective-use computer centers. The posed problem encompasses various aspects of development and operation of ASU and primarily of increasing their qualitative indices.

The analysis which we conducted showed that there are many problems for further increasing ASU efficiency.

Such an important factor as loading of computer capacities has a significant effect on the economic effectiveness of systems operation. After all, the mean computer load in the Ukrainian SSR does not exceed 12 hours, instead of 16-18 hours per day, and specifically that of third-generation machines is even less--10 hours. In this case the rates of increasing the computer load lag considerably behind the rates of production. A paradox is found: we introduce new machines but the indices of ASU are deteriorating. There are many reasons for this, but the main ones are low-quality design of systems, the agency principle of computer distribution to users, the incomplete delivery of equipment, the weak effect of the economic incentives mechanism, personnel training and so on.

One of the main reserves for increasing ASU efficiency is improvement of the technical and economic parameters of the system formulated at the design stage. Can the phenomenon be regarded as normal when the starting complexes of ASU introduced in sectors of the national economy of the republic clearly do not meet modern scientific and technical requirements? Thus, the first unit of the ASUP [Automated production control system] of the Krivoy Rog Wool-Spinning Mill included 21 tasks with a computer load of 5.3 hours, the ASUP of the Ivano-Frankovskpromstroy Combine included 12 tasks and 8.1 hours, respectively, and that of the ASUP of the Balakleya Cement-Slate Combine was 37 tasks and 8.5 hours. The examples could be continued. But how do these parameters look on the background of many developed ASU where 200-250 control tasks are solved and the computer equipment load comprises 18-22 hours per day? For example, these are the automated control systems of the Kiev Automatic Machine-Tool Plant imeni Gor'kiy, the Dnepropetrovsk Pipe-Rolling Plant imeni Lenin, the Novokramatorsk Machine Building Plant imeni Lenin and among sector systems is the ASU-Pribor. As we can see, the contrasts are impressive.

The situation is aggravated by the low delivery of software and information systems. If the structure of the problems solved in ASU is analyzed, the specific weight of problem-solving routines for optimization and programming usually does not exceed an average of six percent of the total amount throughout the republic. This indicator of systems development is of decisive significance in providing for the greatest profitability of funds invested in ASU. With regard to solution of general problems within a sector or republic, so-called "indirect" problems, the percentage of them is even less. And this is an indicator of systems integration to a significant degree and their compatibility and interaction. This was noted in the decisions of previous party congresses.

However, as indicated by the practice of systems development, even in one sector of the national economy, ASU are developed and introduced locally without proper tying-in of them and at a low scientific and technical level. For example, the ASU for material and technical supply of a number of facilities of Goskomsel'khoztekhnika [State Committee for Supply of Production Equipment for Agriculture], located in the Ukrainian SSR (Dnepropetrovskaya, Khar'kovskaya, Chernovitskaya and other oblasts), and some ASU of enterprises of Minpromstroy [Ministry of the Construction Industry] of the Ukrainian SSR (the Production Association Odessazhelezobeton, the republic industrial association Krymzhelezobeton and so on) were introduced with four to six tasks. This is why "bottlenecks" for integration of ASU on sector and republic scales are generated. And it is quite incomprehensible how to combine them into a general state automated control system.

And now when introduction of ASU has adopted wide scales, the capacities of computer equipment produced have increased, specific experience of development and introduction of ASU has been accumulated and, as noted in the draft to the 26th Party Congress, the problem has been raised of developing integrated systems based on automated shops and plants and the requirements on qualitative indices of systems have increased significantly.

Therefore, we feel that the paragraph "Improvement of computer equipment, its component base and software, information transmission and processing equipment and systems, increasing the efficiency of automated control systems and development of computer networks and collective-use computer centers" in section III of the Main Trends should be supplemented with the words: "Improve their scientific and technical level."

At the same time problems of personnel training and retraining at enterprises and organizations that introduce computer equipment and overcoming the "psychological barrier" among managers merit attention. One of the factors that have a significant effect on formation of this barrier is the lack of knowledge by managers of the main advantages of ASU, which indicates the need to carry out well-thought-out propaganda and educational work.

Taking the importance of the posed problem into account, we suggest that the paragraph "Improve personnel training and raising of qualifications in production" in section VIII of the draft end with the words: "train personnel in efficient utilization of new means and methods of control using computer equipment."
[132-6521]

6521
CSO: 1863

COMPUTER CENTER EFFICIENCY DISCUSSED

Moscow EKONOMICHESKAYA GAZETA in Russian No 3, 1981 p 8

[Article by V. Vedishchev, sector head of Scientific Research Institute of Problems of Organization and Management]

[Text] One of the directions for improving the economic mechanism at the modern stage is to develop machine technology for processing and using management information. The problem of increasing the quality and operational nature of accounting and statistics with extensive use of the capabilities of computer equipment is posed in the draft of the CPSU Central Committee to the 26th Party Congress. The role of computer centers (VTs) and the significance of problems related to increasing the efficiency of using them increases under these conditions.

Conversion to an essentially new organizational form of using computer equipment--collective use--will permit a significant increase of VTs efficiency. Development of a specialized dispatcher service, which controls the computer load of the computer centers of cities and territories, also contributes to an increase of VTs efficiency.

The USSR State Committee for Science and Technology organized an experimental dispatcher service (EDS) at Kiev as early as 1977.

The efficiency of dispatcher services confirms the experience of these organizations at Alma-Ata and Tbilisi. They realized additional machine time worth hundreds of thousands of rubles throughout the year.

The network of dispatcher services will be expanded during the 11th Five-Year Plan and will encompass Moscow, Kishinev, Minsk, Odessa, Khar'kov, L'vov and other cities. Their development poses a number of problems, solution of which would make it possible to improve the operation of these services.

Cost-accounting bases must be introduced in the relations between users and the dispatcher service. To do this, objectively acceptable and scientifically founded forms and dimensions of joint calculations of the dispatcher service and users sould be worked out even during the experimental stage.

Local bodies should create more favorable conditions for the dispatcher services organized in cities and should allocate the required facilities and transport to them for these purposes.

The matter of developing the standard documentation for the dispatcher service will be accelerated significantly.
[130-6521]

6521
CSO: 1863

DATA ENTRY AT GOSBANK

Moscow DEN'GI I KREDIT in Russian No 1, Jan 80 pp 35-41

[Article by V. G. Baglayev, chief of computer center of Novosibirsk Oblast Office of Gosbank, and P. I. Chebayevskiy]

[Excerpt] Seven years have passed since the computer complex Bank was put into industrial operation at the Novosibirsk Oblast Office of Gosbank. The collective of the computer center works continuously on expanding the range of problems solved and on increasing the institution's service by the VTs [computer center]. The number of service institutions has now reached 35 (it should be noted that the computer center of the Novosibirsk Office is the first among the computer centers of Gosbank to begin servicing Gosbank branches of its office in other cities and also institutions of Gosbank subordinate to the adjacent office of Gosbank; thus, the Novoaltaysk branch of the Altay Kray office of Gosbank was enrolled for servicing on 19 March 1976 and acceptance of the last institution in Barnaul--the October branch--was completed in March 1977. Work on acknowledgement of reciprocal MFO [Moscow Finance Department] has also been carried out on the computer from the first day of servicing any institution of Gosbank for it).

The computer center is systematically engaged in improving the production process of information processing and software of problems being solved and also in development of algorithms and programs of new problems. Let us dwell on only some of them.

Since mid-1978 the computer center has begun to introduce a program for direct entry of information into the computer from communications channels, developed by the computer center of the Rostov office of Gosbank. Despite the fact that the computer center received only 10 telegraph sets as part of centralized supply in 1978-1979, direct entry of information into the computer, as of 1 January 1980, is being used by 30 out of 35 institutions being serviced. One of two computers contained in the Bank complex is being allocated for direct entry from 0800 to 1700 at the computer center of the Novosibirsk office. All work on solving the problems of "Operating day," "MFO control," "MFO acknowledgement," "Summary bookkeeping and statistical reporting," "Economic developments" and so on has gone to the other computer.

This makes it necessary for the workers of the computer maintenance department to ensure constant readiness of hardware for operation. Successful introduction of the method of direct entry of information in the computer by most of the institutions of Gosbank being serviced made it possible to remove the existing tension both in the work of the telegraph operators and workers of the control groups of Gosbank institutions and the workers of the receiving department and information processing control and output department of the computer center.

In 1979 the additional monthly solution of the problem "Operating day" to reflect operations on disbursement and withdrawal of money from circulation during the last day of the month in accounting operations was cancelled. These operations are now reflected on the first working day of the new month as final circulations for the past month. Changing the procedure of reflecting withdrawal operations of the previous month in accounting made it possible to bring order to organization of the entire operation on the first working day of the new month both at the computer center and in the Gosbank institutions.

The previously existing delays of information input and checking, the beginning of solving the problem "Operating day" by current operations on the first and second runs and as a result the delay in computer preparation of letters of advice by the beginning MFO were eliminated.

Conversion to direct computer entry of information aggravated the problem of a shortage of machine time. Since one computer was totally engaged from 0800 throughout the entire working day on direct entry, all other work in the Bank complex had to be fulfilled by using only the second computer of the complex. This was not easy to do since, besides solving the problems of "MFO control," "MFO acknowledgement" and others on this same computer, information was entered from punch cards from five Gosbank institutions and was adjusted and the problem "Operating day" was also solved by the first and second runs.

There was a shortage of machine time to complete all this work even with ideal operation of hardware. If devices failed, even temporarily, tension was created. The decision to convert from three- to two-run solution of the problem "Operating day" was adopted to make up for the resulting shortage of machine time. With two-run solution of the problem "Operating day," one computer of the Bank complex receives information from 0800 to 1700 for direct entry from communications channels. In this case the information received up to 1445 is processed by the conditional second run and that received from 1500 to 1645 is processed by the third run. The time from 1445 to 1500 and from 1645 to 1700 is allocated for correction of the entered information.

The second computer of the complex is used from 0800 to 1100 to solve the problems "MFO control," "MFO acknowledgement" and others, while it is put at the disposal of the programmer mathematicians for program debugging from 1100 to 1300. Prior to conversion to solution of the problem "Operating day" by two runs, programs were usually debugged only at night, i.e., on the third shift. This same computer is used from 1300 to 1500 to enter and regulate information of Gosbank institutions which deliver punch cards to the computer center and it is used from 1515 to solve the problem "Operating day" by the second (actually the first) run.

Organization of work by the schedule presented above made it possible, although not completely, to solve the problem of a shortage of machine time. We suggest that the problem of a shortage of machine time during daytime hours will be completely overcome after conversion to direct entry of information of all Gosbank institutions and after freeing of machine time now expended on entry and regulation of information entered from punch cards.

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INTRODUCTION OF AUTOMATED CONTROL SYSTEMS FOR PRODUCTION PROCESSES SUMMARIZED

Moscow EKONOMICHESKAYA GAZETA in Russian No 7, 1981 p 15

[Article: "Production Processes are Controlled"]

[Excerpt] The results of fulfilling the plan of the 10th Five-Year Plan on introduction of ASU [Automated control system] for production processes were summarized at the State Committee of the USSR on Science and Technology. A total of 1,283 automated control systems was introduced during these years.

ASU with a high scientific and technical level were most widely distributed. The unique system for control of production processes of waste-free production Nefelin-2k began to operate at the Pikalevo Association Glinozem (Leningradskaya Oblast). Soda, potash and cement are now produced as a byproduct of the main product--alumina--by using it.

Problems of optimizing the management of production processes were solved in a number of systems (ASU of the combined petroleum refining installation at the Mozyr' Petroleum Refining Plant and the ASUTP [Automated control system of production processes] for producing nitroammophoska at the Cherepovets Chemical Plant). This made it possible to produce an additional 15,000 tons of motor fuel at the Mozyr' NPZ [petroleum refining plant].

Adaptive control systems were developed (for example, on mill 160 of the Pervoural'sk New Pipe Plant). They were self-adjusted to the optimum operating mode.

A number of systems introduced at rolling mill 2000 of the Novolipetsk Metallurgical Plant, in converter production of the Azovstal' Plant and the Zaporozhskaya GRES made it possible to solve problems of production and organizational management.

The ASUTP for complex gas preparation of the production association Urengoygazdobycha provided additional delivery of fuel to the main gas pipelines at the rate of 50 million cubic meters annually. Similar systems will also be introduced at 10 plants of the Urengoy facility.

There are also advances in development of pilot models of ASU of main production processes on the basis of third-generation computers (approximately 200 have already been designed) in power engineering, oil and gas production and transport, ferrous and nonferrous metallurgy, chemistry, machine building and paper and construction materials production.

But not all the planned ASU of production processes were introduced on time. The main cause for the interruption is the lack of preparedness of enterprises and organizations and also a shortage of specialized devices and means of automation. Minpribor [Ministry of Instrument Making, Automation Equipment and Control Systems] should have developed and organized production of sensors for the ASUTP of the pulp and paper and textile industry and interrupted the task. As a result, the systems were introduced in limited volume at some enterprises of Minlegprom [Ministry of Light Industry] of the USSR and this significantly reduced the effectiveness of using them. For example, only 458 of 1,364 machine tools were connected to the ASUTP for silk production due to a shortage of sensors at the Darnitsa Silk Combine. The annual saving from introduction of the automated system was immediately reduced by 200,000 rubles.
[130-6521]

6521
CSO: 1863

ALL-UNION CONFERENCE OF COMPUTER NETWORK WORKERS OF USSR CENTRAL STATISTICAL ADMINISTRATION

Moscow VESTNIK STATISTIKI in Russian No 12, Dec 80 p 56

[Article]

[Excerpt] The Main Administration of Computer Work of the USSR TsSU [Central Statistical Administration] held a conference at VDNKh [Exhibition of Achievements of the National Economy] of the USSR in August 1980 "On the results of operation of the computer network of USSR TsSU in complex mechanization of bookkeeping and accounting in agricultural enterprises during 1976-1980 and on prospects for the 11th Five-Year Plan."

The deputy acting chief of GUVR [Main Administration of Computer Work] of the USSR TsSU N. D. Ivanov, who discussed the operation of the computer network of the USSR TsSU and the prospects of its development, opened the conference.

In his report, the deputy chief of GUVR, USSR TsSU V. D. Ryzhavin summarized the work of the computer network of the USSR TsSU in complex mechanization of bookkeeping and accounting at agricultural enterprises during 1976-1980 and talked about the problems for the 11th Five-Year Plan.

It was noted that a number of joint measures were undertaken by the USSR TsSU and the USSR Minsel'khoz [Ministry of Agriculture] during the 10th Five-Year Plan which provide for significant expansion of mechanization of accounting and computing work on kolkhozes and sovkhozes.

Introduction of complex mechanization of bookkeeping and accounting on the PVK M-5000 (it has already been introduced on 300 kolkhozes and sovkhozes) was begun with regard to delivery of computers of type PVK M-5000 to the computer system of the USSR TsSU, said the reporter, and with regard to development of a standard plan for complex mechanization of bookkeeping and accounting at agricultural enterprises using the PVK M-5000.

Work has already been completed on introduction of complex mechanization of accounting on all kolkhozes and sovkhozes of 28 rayons, including 19 rayons of the Latvian SSR (on the PVK M-5010 in Yekabpilsskiy Rayon), three rayons of the RSFSR, three rayons of the Ukrainian SSR, two rayons of the Belorussian SSR and one rayon of the Kirgiz SSR. The experience of the 28 rayons showed that introduction of complex mechanization of accounting at all agricultural enterprises of the rayon simultaneously is more effective than at individual facilities. The report noted that complex mechanization of bookkeeping and accounting will be introduced at all agricultural enterprises of the republic in the Latvian SSR before the end of 1980.

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CSO: 1863

AUTOMATED SYSTEMS FOR THE CONTROL, PLANNING, AND ORGANIZATION OF PRODUCTION IN CONSTRUCTION

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 2, Feb 81 pp 55-64

[Article by USSR Minister of Industrial Construction A. Tokarev]

[Text] In the 10th Five-Year Plan, the USSR Ministry of Industrial Construction made significant positive changes in different units of construction production--planning, control, and organization. The quantity of automated systems used for these processes has been increased significantly, and their quality and the effectiveness of the work have risen. Improving automated systems, and outfitting them with more-dependable technical resources, the ministry is expanding the sphere of their application from one year to the next.

In the 10th Five-Year Plan the ministry's specialists developed and introduced 10 major automated control systems into operation. Almost 60 percent of the planning computations and 80 percent of the accounting operations have been automated. An equivalent of about 700 workers have been freed of lengthy, painstaking computations. Electronic computers are the technical foundation of automated systems, and they are gaining an increasingly stronger position in support of the most diverse functions of the multilevel construction process.

Almost 70 computer complexes are being used to control production, to plan it, to monitor construction progress, and to check engineering computations and plans. These computer complexes make up the foundation of about 150 automated control systems capable of solving over 1,000 production control problems.

A branched network of various ASU's [automated control systems] was created, with 55 operating information and computer centers possessing "Minsk", YeS, and "Nairi" computers. The ministry's organizations possess 8,000 shortwave and ultrashort-wave radio stations, 360 automatic and manual telephone stations, about 5,000 dispatch and other switchboards, 1,500 repeater amplifiers, and over 400 teletype machines. In the 10th Five-Year Plan the quantity of apparatus used in the work of automated systems grew by more than three times.

At the same time the sector is experiencing an acute shortage of information transmitting resources, peripheral equipment, and production recorders to support the automated systems being created. This is having a negative influence on the effectiveness of computations being made, and on the rate at which branched data processing systems with subscriber terminals are being created. The effectiveness of multiple-user information and computer centers--computer time-sharing centers--is significantly lower.

Development of automated construction control systems (ASUS) in the USSR Ministry of Industrial Construction is proceeding in mutual coordination with territorial and national systems. This insures integrated execution of control tasks, and their organizational, technical, mathematical, normative, and informational unity. ASU's operating on the basis of computers and the methods of mathematical economics are a dependable reserve for raising the effectiveness of construction production, and a universal means for the best possible consideration of the unique features of construction and the working conditions of the collectives, and coordination of the activities of all participants of construction.

The CPSU Central Committee's draft "Basic Directions of the USSR's Economic and Social Development in 1981-1985 and in the Period to 1990" poses the task of improving the work of the administrative machinery, disseminating sensible work procedures more actively, improving automated planning, accounting, and control systems, and making fuller use of computers. This is why the ASU is acquiring a more important role in the 11th Five-Year Plan, in a time when the sector is entering a new period of development in connection with the CPSU Central Committee and USSR Council of Ministers decree on improving the economic mechanism. ASU's are becoming the economic mechanism's important tools to improve material and technical support, labor organization, the construction processes employed in building various facilities and production operations, and the structure of construction control, to develop and introduce the achievements of science and technology, and to utilize the experience of the innovators.

The work of automated systems is being improved mainly on the basis of the results of integrated long-range specific-purpose programs dealing with the key problems of construction production: organization of flowline production, industrial erection of buildings and structures, integrated supply of construction projects, and so on. A valuable source of these improvements is the experience accumulated by the ministry during its implementation, in 10th Five-Year Plan, of long-range specific-purpose programs such as "Quality", "Flow", "Outfit", "Contract", "Monolith", "Progress", and SIDPS (Industrial Long-Range Flowline Construction System).

The OASUpromstroy [Branch Automated Control System for Industrial Construction] is the central automated construction production control system for the sector and the ministry as a whole, functioning at all levels of control--from the union ministry down to the construction teams. The first generation of this system, which was designed by the ministry's specialists, is now operating within the ministry. It is a combination of an automated industrial construction control system (operating at the union ministry level), the ASU's of the republic ministries of industrial construction, and the ASU's of the main construction administrations. In turn, the ASU's of the republic ministries of industrial construction and of the main construction administrations consist of functional subsystems (complexes of tasks), and they represent combinations of the ASU's at lower levels of control--trusts, combines, and enterprises.

The functions thus performed at all levels of control make it possible to automate various aspects of planning--development and distribution of the sector's business enterprises, technical-economic planning, the planning of labor and wages, scientific-technical progress, capital construction itself, construction production and its mechanization, the work of transportation, material-technical supply, financial activities, and so on, and to monitor and regulate these processes, contracted work, and the placement of facilities and production operations into use.

The OASUpromstroy includes three other systems of different purposes: the ASPR--automated plan calculation system, the ASOU--the automated operational control system, and the AIS--the automated information system.

The ministry is simultaneously building about 10,000 facilities for more than 200 plants. The general task of the ASPR is to coordinate the activities of all the participants of construction.

Being a part of the OASUpromstroy, the ASPRpromstroy [Automated Plant Accounting System for Industrial Construction] is a part of the OASUpromstroy, and it is organically associated with systems responsible for monitoring and regulating production. It is intended to produce several versions of calculations for plan drafts. It includes: a system of computer models, algorithms, and programs; information summaries and a document handling system; computers, organizational equipment, and communication resources; job organization and personnel systems. The ASPRpromstroy combines plan development with control of plan execution at all planning levels. Computers and organizational equipment as well as communication equipment are used in the preparatory functions and calculations necessary for development of plan drafts; planning specialists handle the entire creative aspect of drawing up plans and making decisions.

The main objective of the ASPRpromstroy is to plan contracted construction and installation jobs. This system develops drafts of long-range, current, and operational calendar plans. Its structural unity is achieved through operation of so-called unified logic blocks, representing complexes of tasks in all subdivisions of planning. A unified bank of data on construction projects is contained within the computer and periodically corrected; this data bank holds all figures describing the sector's projects. Planning problems are solved with the help of standards and reference materials contained in the computer memory and selected on the basis of all-union classification criteria. The different versions of plan drafts that can be obtained with the help of the computer permit selection of the economically most feasible plan, better elimination of production bottlenecks, and more-effective regulation of resource distribution.

The system of mathematical-economic models for the ASPRpromstroy, which was developed by the ministry, is an aid in computing optimum draft plans for construction and installation jobs at different levels--the union ministry, the republic ministry (main construction administration), and the trust (combine). These plans are written up with a consideration for the control figures of the five-year plan, the possibilities afforded by the available material, financial, and labor resources, the importance of the construction projects, the norms of resource expenditure, and the norms of construction and installation time; all of these figures are used to determine the planned construction volume for each project. A YeS-1022 computer was used to calculate draft plans for the ministry's work in 1981 and for the main construction administrations. The annual profit increase enjoyed due to the use of the ASPRpromstroy as the basis for planning the ministry's operation is 1 million rubles.

The USSR Ministry of Industrial Construction's Glavsevzapstroy [Main Administration of Construction of the Northwestern Regions] has achieved significant results in its switch to automated planning. An effective unified data bank was created in this administration to assist computer planning of construction and installation jobs, the commissioning of facilities and production operations, and the manufacture of commercial construction products by enterprises and businesses of the main construction administration. This data bank makes practically unlimited expansion of the range of plan calculations possible, and it improves the economic grounds of the calculations, which significantly influences improvements in construction organization. The experience of the Glavsevzapstroy is now being utilized in the sector to improve the operation of the entire ASPRpromstroy.

The Glavbashstroy [not further identified] is using an automated system for seeking optimum decisions in operational planning--the ASPOR, developed by the main administration's KIVTs (Time-Sharing Information and Computer Center). The ASPOR is used to draw up plans for the work of teams, sections, construction administrations, and trusts. This system performs a complex of tasks: The minimum labor resources necessary to finish construction projects by their deadlines and the minimum construction time possible with the labor resources available to the various organizations are determined; work plans are drawn up for the different executors at particular construction projects, and for different construction projects in relation to specific executors; annual work plans broken down in relation to months of the year and different executors are drawn up for specific complexes and construction projects. The ASPOR is used to calculate: the technical-economic indicators of the work plans for different executors (teams, sections, construction administrations); the demand for material-technical resources in jobs performed on the basis of a network schedule, in relation to different executors and construction projects; the annual demand for labor resources, broken down into months of the year and in relation to specific executors (the availability of personnel in different occupations at each construction project and complex is considered in this case); the annual demand for material-technical resources, broken down in relation to the months of the year for specific projects and complexes; the physical work volume for the year, broken down into months of the year, in relation to specific complexes.

Project network schedules are used as the models of construction in the system. The system consists of two parts: a main automated part operating on the basis of the complex of programs in the ASPOR, and an unautomated part represented by selection and preparation of the raw data, selection of a plan variant, and decision making by the executives of organizations and operational control services. As a result of automated optimization, three forms of plans are drawn up. First there is the "plan of necessity", drawn up for each construction project and foreseeing completion of the project by a set deadline at a minimum total demand for labor resources. Second there is the "plan of possibility", which is balanced in relation to available labor resources and which foresees, in unfavorable circumstances, minimum deviations from project completion time in the event of a manpower shortage suffered by the construction agencies. And third there is the "intermediate variant". In it, the manpower limitations of the executor organizations are considered, and a "plan of possibility" is drawn up for them, while for the rest of the executors these limitations are not considered, and "plans of necessity" are issued to them.

Plan variants are calculated by this system with technically simple models. This is made possible owing to the modular structure of the ASPOR's program complex. All modules are represented by ASPOR programs written in YaSK and COBOL for the Minsk-32 computer.

Information can be displayed in 54 tabulated forms, in any form and number of copies required. These documents are intended to be used by operational dispatch groups (ODG's) of construction complexes, ASU [automated control systems] subdivisions of trusts, the planning divisions of construction administrations and trusts, the production-technical divisions and executives of construction administrations, section chiefs, senior workmen, workmen, foremen, team leaders, the capital construction divisions of the client enterprises, production-technical supply administrations, and the dispatch services of construction administrations and trusts.

Use of the ASPOR has significantly raised the role and effectiveness of the work done by construction organizations on the basis of network schedules. Operational plans for construction and installation drawn up with the help of the ASPOR are in keeping with a sensible succession of jobs. The manpower of executor organizations is now being distributed more sensibly. Planning quality has risen significantly. Concurrently, planning services and operational dispatch groups are freed of laborious computations.

The automated information and reference system--the AISS, which was developed by the main administration's KIVTs, has made noticeable improvements in the managerial activities of the Glavpriokstroy [not further identified]. The functions of this system include: five-year and two-year planning of construction and installation within the main administration, as well as annual planning broken down into quarters; surveillance over the fulfillment of monthly, quarterly, and annual plans (monthly operational summaries and quarterly summaries--"The Work Results of Glavpriokstroy"--are drawn up in this case, and summaries of such information can also be issued on demand); provision of information in support of plans for introducing new equipment and measures aimed at increasing labor productivity, and surveillance over the fulfillment of these plans and measures, to include publication of summaries on a regular basis and as demanded; the planning of integrated deliveries of prefabricated reinforced concrete to construction sites; control over the signing of contracts with subcontracting organizations; control over the arrival and unloading of rail cars, and so on.

Despite differences in the sort of information employed, all subsystems of the AISS function on the basis of unified general-purpose software--a package of applied ASOI [not further identified] programs, which permits the input, storage, correction, formation, and arithmetic and logical processing of data, decoding, and display of reference information in different forms, to include graphs. The package of applied programs is written for the Minsk-32 computer. Additional programs making it possible to correct the data base of YeS computers with the help of displays, and to subsequently feed this data base into a Minsk-32 computer are available. General-purpose software makes it possible to plan any sort of information system within a few days. Any querry can be written up in a few minutes. Reference material requiring interrogation of the maximum volume of the base is produced in 30 minutes. The system's limit is a data base consisting of up to 20,000 documents. The data of the AISS can be used in any sector of the national economy. Conversion of the system to the technical base of YeS computers has begun.

In order to insure attainment of the end result of construction--the commissioning of especially important facilities and production operations, the USSR Ministry of Industrial Construction has created an automated system for operational control over construction of such facilities and production operations--the ASU-OV. This is a controlling and monitoring system. Its subsystems monitor the progress of construction and its control at the construction sites of chemical, petrochemical, petroleum refining, light, food, and meat-and-dairy industry, in the nonchernozem zone of the RSFSR, and in a number of other industrial sectors of the national economy--more than 20 ASU in all.

The ASU-OV is intended for the following tasks: Monitoring fulfillment of the construction and installation plan in cost terms, and the availability of workmen, for the period of construction and in relation to individual organizations; monitoring completion of physical volumes of work in relation to specific production stages, and accounting for deviations in the rhythm of the construction plan, citing the causes for such deviations; generating decisions to insure satisfactory construction progress. Construction is monitored in stages--in procedurally integrated complexes of construction and installation jobs. The making of decisions to eliminate shortcomings is within the competency of the ministerial administration, as well as the main administrations and republic ministries of industrial construction subordinated to it.

An operational dispatch group has been created at each trust in order to support the system's operation; such a group prepares the raw data for each construction project, maintains systematic surveillance over construction progress, reveals the causes of deviations from the program, analyzes the causes, and prepares recommendations on their elimination. Operational groups consisting of representatives of the appropriate organizations of the USSR Ministry of Industrial Construction, the USSR Ministry of Installation and Special Construction Work, client ministries, and the USSR Gossnab have been organized under the ministries of industrial construction of the union republics, the main construction administrations, and the combines and associations. A combined information center is now being created in response to a joint order of these organizations.

The ASU's information is subdivided into input and output information. Input information includes reference, planning, operational, and analytical information. Reference information is subdivided into general and special. General reference banks are used in conjunction with the entire set of operational information, while special reference data are used in the processing of the characteristics or parameters of each concrete construction site.

Planning information includes the following data: the physical work volume for each month, as required by the basic production stages of construction; the plans for deliveries of metallic structures and prefabricated reinforced concrete products; the plans of construction and installation for the year and for the current month; the planned number of laborers for the current month.

Operational information, which is stored separately for each construction site, includes the following data: on completion of physical volumes of work in the principal production stages, broken down in relation to specific construction projects, and for the entire complex as a whole; on fulfillment of particular quantities of construction and installation jobs, in different time periods and in relation to different participants of construction; on the availability of materials and manpower at the construction site; on the causes of deviations from the construction plan; decisions on correcting these causes and eliminating deviations from the planned course of construction; reports having the nature of remarks and explanations; data on the anticipated time of job completion in different production stages at the construction site.

Analytical information is formed at the operational information processing stage, and it is expressed as percentages of completion of the following: the physical work targets, the plans for construction and installation jobs and for deliveries of materials, and the targets for personnel recruitment for construction (in relation to specific time intervals and organizations participating in construction).

The output information summarizes data describing the construction status of certain facilities, in two aspects: in relation to the general contracting ministries of industrial construction and main administrations, and the client ministries.

The ASU is promoting growth in the effectiveness with which materials and manpower are being used, and rhythmic work at the construction sites. One unique feature of the system is the use of unified formats for presenting information; another is the high organizational dependability with which operational information is presented, and its clarity and authenticity.

An automated system for planning the trucking of ready-mix concrete and traffic control--the ASPRUT, developed by the KIVTs of the USSR Ministry of Industrial Construction's "Ryazan'stroy" Association, has been extensively introduced. It integrally solves problems associated with optimum planning, operational control, bookkeeping, and organizational and legal support, associated with organizing and making shipments of ready-mix concrete. The ASPRUT performs the following functions: calculation of hourly schedules for deliveries of ready-mix concrete to construction sites, and surveillance over the progress of these deliveries; surveillance over the quality of the work of supplying plants, trucking enterprises, and construction organizations; analysis of deviations from the schedule for delivering ready-mix concrete to construction sites, and preparation of recommendations on eliminating the revealed shortcomings in the work. Moreover it performs computations associated with the following: driver wages; technical-economic indicators of the work of motor transportation; accounts between organizations functioning within the ASPRUT; property sanctions imposed on persons causing interruptions in the work, and provision of reports on ready-mix sales.

Hourly schedules for ready-mix deliveries are calculated with the help of an algorithm accounting for the sort of production processes involved, the amount of slurry consumed, and the hauling distance. Moreover the schedules foresee full loading of motor transportation during each shift, and traffic is scheduled in such a way as to minimize empty runs.

The entire complex of programs of the ASPRUT was written in YaSK for the Minsk-32 computer. Full automation of the computations, low requirement of computer time for calculations, and convenience in forming and correcting standard and reference information all impart high operational characteristics to the system.

The ASPRUT functions in accordance with requirements written for ready-mix trucking organizations as spelled out in a statute on mutual relationships between construction organizations, industrial and trucking enterprises, and information and computer centers participating within an automated system for planning the trucking of ready-mix concrete to construction sites, and operating on the basis of business contracts.

Integrated use of the ASPRUT in the "Ryazan'stroy" Association made it possible to reduce losses of working time due to delays in deliveries of slurry and concrete from 60 percent of the total losses of working time down to 2 percent. The output of trucks carrying ready-mix concrete increased by 1.5 times, and the actual output of installers, masons, and plasterers increased by 10 percent. Interruptions in deliveries of slurry to construction sites were decreased from 20-30 percent to 2-5 percent in "Ryazan'zhilstroy" Trust, the main user of slurry in this association. The ASPRUT now handles 95 percent of the deliveries of slurry, ready-mix concrete, and asphalt-concrete to the association's construction sites. The annual economic impact enjoyed from using the ASPRUT is 210,000 rubles.

The Belorussian SSR Ministry of Industrial Construction has accumulated favorable experience in introducing automated systems into production. A special purpose program entitled "Improvement of Construction ASU Control and Introduction" is being used here to achieve more-effective solution of production problems. Being an inherent part of the Belorussian Ministry of Industrial Construction's master program entitled "Experiment", during implementation of which the ministry switched to the new principles of business management, this special-purpose program interacts organically with the following automated subsystems: "ASU--Labor Productivity", "ASU--Introduction of the Team Contract Method", "ASU--Introduction of New Structures and Materials Into Construction", "ASU--Creation and Introduction of Mechanized Resources", and "ASU--Raising Construction Quality".

The "Promstroysistema" Production-Technical Association of the Belorussian SSR Ministry of Industrial Construction has enjoyed good results in its effort to introduce automated systems. Effective integrated tasks and systems of the following sort were developed and are now being used successfully in Belorussia's construction collective: Computer calculation of plans for construction and installation, to include determination of the demand for material and technical resources in terms of specific projects and estimates; drawing up planning documents for teams operating on the basis of basic khozraschet; "AIS [automated information system]--trust--ministry"; a system for analyzing and predicting basic technical-economic indicators; the "Kadry" information and reference system, the "AIS for construction quality control", and others.

An automated system for control of the supply of prefabricated reinforced concrete to construction sites--the ASU-ZhBI--is now operating in Glavpriokskstroy. It was developed by Glavpriokskstroy's KIVTs in collaboration with the "Tulzhelezobeton" and "Priokskstroykomplekt" trusts. The software for the system was developed by the main administration's KIVTs.

The ASU-ZhBI is intended for quarterly, monthly, and 2-week planning of deliveries of prefabricated reinforced conrete articles to construction sites in production-line packages. It is used to maintain surveillance over the production and deliveries of reinforced conrete articles to trusts by construction industry plants, and to calculate the need for materials to support planned production of specialized articles. A typical feature of this system is separation of the functions of preparing and collecting supply statements from the functions of planning the demand for prefabricated reinforced concrete.

The normative base of the ASU-ZhBI consists of the information on the articles and the output capacities of the production lines at reinforced concrete articles plants. The system's software consists of two general-purpose packages of applied programs--PPP-ASOI and PPP-Nbaza, developed by the Glavprioksksstroy's KIVTs. The PPP-ASOI program is used to manage the basic data from supply statements, to create and issue reports and orders for delivery of articles to construction sites, and to monitor fulfillment of the plans for supplying reinforced concrete articles. The PPP-Nbaza is used to manage the article standards, to check the correctness with which supply statements are filled out, and to compute the demand for materials and foundation articles.

The ASU-ZhBI operates on the basis of a Minsk-32 computer. It takes 3 hours to introduce supply cards for 100 construction projects. A quarterly plan can be drawn up in 20 hours. Eight hours are required to produce 1,000 single-page orders. The annual economic impact from using the ASU-ZhBI is about 300,000 rubles.

The KIVTs of the "Sevosetinpromstroy" [not further identified] administration has developed an automated control system for residential construction combines--the ASU-DSK, which is now being employed in the construction organizations. The system is responsible for the planning, accounting, control, analysis, and regulation of the activities of all components of the "plant--warehouse--transportation--object being installed" pipeline. The work of this pipeline is planned on the basis of a dynamic model consisting of algorithms and a normative-reference base in which the basic parameters of all components of the objects of control and the operational data are defined. The normative base consists of: the list of articles produced by the DSK [residential construction combine]; normative cards defining the amount of resources expended per article; schematic diagrams describing assembly of typical block-sections; the characteristics of the transportation resources; lists of production operations indicating the labor outlays, the cost estimates, and the executors.

The ASU-DSK makes it possible to reduce working time in the assembly teams due to the prompt supply of articles, and to decrease the quantity of reinforced concrete held at the finished-product warehouse and in warehouses at the construction sites; to raise the level of plant completion of reinforced concrete articles; to reduce manual labor in DSK services, and to improve the quality of reinforced concrete article production plans; to insure a rhythmical flow in the performance of assembly jobs, and to increase the material interest of plant contracting teams in the end results of the work. The annual economic impact from using this system in the "Sevosetinpromstroy" DSK was 118,800 rubles. The experience of North Ossetian builders deserves attention.

The experience of the Glavvostoksibstroy [not further identified], which has developed and introduced a system of computer-calculated plans for work based on team contracts, has great practical experience. As a result of this introduction, the time required to prepare the planning and accounting documents decreased on an average from 1 month down to 5 days.

In order to improve operational management and control of the contracting activities of organizations in the USSR Ministry of Industrial Construction, the ministry has introduced an automated system to collect and process operational information on contracts--the ASOIdogovor. This has significantly simplified the contract campaign.

Use of mathematical methods and computers in the automation of planning is producing a significant impact. Use of computers by ministerial planning institutes has reduced the time spent on engineering computations by about three times. For the first time in construction planning, the Odessa Planning Institute No 3 of the USSR Ministry of Industrial Construction used a computer to calculate the parameters of the foundations of a certain industrial facility; all parameters were mutually coordinated and unified, and working drawings were issued. This work earned medals at the Exhibition of the Achievements of the USSR National Economy.

Ministerial planning organizations are using an integrated program for automated computation of single-pipe water heating systems. They use computers to calculate the electric loads, to draw up summary documents on the equipment and materials, to design the aspiration, ventilation, and pneumatic transport systems, and so on. Estimates are now released five times faster, and the outlays on them were reduced by a factor of two owing to introduction of an automated planning estimate computation method in the planning organizations.

The ASUkontrol'-2 is presently operating in the ministerial administration. Using it, the USSR Ministry of Industrial Construction monitors fulfillment of the decisions of the ministry's governing board, and its orders. Each year this system monitors execution of 6,000-7,000 orders, embracing both subdivisions of the ministry's administration and peripheral subordinated organizations. As a consequence the efficiency of the work has grown noticeably.

The State Information and Computer Center of the USSR Ministry of Industrial Construction has developed an integrated data processing system for the construction sector--the ISODOS, using universal software packaged according to the modular principle. Each module performs a certain technologically complete function, and is tuned to different input and output parameters. Module tuning entails recording the input and output characteristics in tables, so-called "logic units". These characteristics are entered in a specially developed language, permitting the unique features of the input and output parameters to be represented by mathematical symbols. A complex tuned with the help of such "logic units" is capable of processing practically any statistical reports. The modular principle and the possibility for generating new modules make it possible to quickly tune the system for operation with dynamically unstable documents, and to obtain new output formats.

The software permits acquisition of intermediate data on different machine carriers. After combination of the data, it can be used in any level of an OASU (branch automated control system). Presently the USSR Ministry of Industrial Construction has software for seven forms of statistical reports requiring the processing of 19 input documents and producing 112 output formats. The universal software was developed for the Minsk-32 computer in such a way that it could be adapted to a YeS computer.

When the OASUpromstroy goes into operation in the 11th Five-Year Plan, the ministry will be able to fully automate computations required in the organizational and technological preparation of production operations and in the writing of plans, operational control and control over production processes, accounting and accountability, and management of planning efforts.

Mass introduction of automated computation methods into the administration of construction and assembly jobs, production of reinforced concrete, metallic, and wooden structures, trucking operations, and material-technical supply will improve construction organization and hasten attainment of the main goal--making facilities operational on time.

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THE ECONOMIC EFFECTIVENESS OF COLLECTIVE-USE COMPUTER CENTERS

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[Article by Yu. Letskiy, V. Semakov and E. Kholomova]

[Text] Collective-use computer centers (VTsKP) equipped with highly productive computers and data transmission apparatus for remote servicing of a large number of users and for interaction with other computer centers are a new, effective form of utilizing modern computer technology.

The VTsKP developed in the USSR TsSU [Central Statistical Administration] on a cost-accounting basis carry out computing operations and information servicing of management bodies, planning bodies and administration of the corresponding level (republic and oblast), servicing of industrial enterprises and associations and also enterprises (organizations) of the nonproduction sphere within ASUP [Automated control system for enterprises] and solution of statistical problems jointly with rayon (municipal) information-computer centers (stations) of state statistics.

It should be noted that problems of VTsKP efficiency have still not been adequately developed. A method of evaluating the efficiency of VTsKP used in acceptance of VTsKP of the TsSU system for operation is outlined in this article.

The economic effectiveness of utilizing highly productive computers compared to using low- and medium-productivity computers at the computer centers of enterprises and organizations is enhanced considerably with functioning of VTsKP. Expenditures for acquisition compared to the version of utilizing low- or medium-productivity computers and also expenditures for construction and installation work due to a relative reduction of the needs for production areas for computer installation and arrangement of personnel are primarily reduced in the case of utilizing highly productive computers. Expenditures for depreciation of hardware and auxiliary computer equipment are reduced with regard to a reduction of expenditures for equipment acquisition and also expenditures for depreciation of production buildings with regard to reducing the production areas when using highly productive computers. A reduction of expenditures on personnel wages is of considerable significance with regard to reduction of the number of maintenance personnel at VTsKP compared to the personnel required for operation of computer centers of enterprises and organizations and also provision of a higher utilization factor of machine time is significant.

All these factors permit a reduction of the cost of computer operations and a reduction of capital expenditures for introduction of computer technology into the national economy with functioning of VTsKP.

The saving from solving user problems at VTsKP is manifested in the form of an increase in the rates of growth of production of enterprises and organizations serviced by VTsKP, an increase of labor productivity and a decrease of product cost, a decrease of delays of access with a simultaneous increase of work quality in the maintenance sphere, a reduction of losses of material, labor and financial resources, provision of rhythmic operation of enterprises and organizations, a reduction of the rates of growth of the number of administrative and management personnel and a saving of capital investments due to optimization of planning and economic problem-solving.

Moreover, additional factors which contribute to an increase of efficiency appear as a result of organizing a VTsKP. They include an immediate effect achieved due to operational access of users to computer resources, an increase of the information content of data obtained by the user by using the automated data bank of the VTsKP, the use of a unified stock of algorithms and programs and the use of unified display and documentation systems.

When considering the economic effectiveness of the new equipment, such indicators as the annual saving and the expenditure recovery period, which may be used in analyzing the economic effectiveness of VTsKP, are most widespread.

The anticipated annual saving (the annual increase of profits) due to introduction of VTsKP into the national economy is determined by the formula:

$$\text{Э} = \text{Э}_{\text{эк}} + \text{Э}_{\text{пр}}, \qquad (1)$$

where E_{ek} is the annual saving due to reduction of operating expenses in information processing at VTsKP compared to the basic version (the version which uses individual or cluster VTs [Computer center]) and E_{pr} is the annual saving of production enterprises and organizations due to improvement of management on the basis of using automated control systems (ASU).

The annual saving from improvement of management in organizations not directly linked to production is not taken into account in formula (1) due to the absence of methods to determine the annual saving achieved in solving the problems of these organizations.

The annual saving from reducing operating expenses by information processing at the VTsKP is calculated as the difference of operating expenses by the basic version and the VTsKP version. The annual saving of production organizations from improvement of management on the basis of using ASU is determined according to the methods now used.[*]

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[*] "Method of determining the economic effectiveness of automated enterprise and production organization management systems." USSR State Committee for Science and Technology, USSR State Planning Committee, USSR Academy of Sciences, Moscow, Statistika, 1979 and "Method of analyzing the economic effectiveness of sector automated control systems (OASU) at industrial ministries, All-Union and republic associations," USSR State Committee for Science and Technology, USSR State Planning Committee, USSR Academy of Sciences, Moscow, Ekonomika, 1976.

The expenditure recovery period for design and introduction of VTsKP is calculated by the formula

$$T_{\text{ок}} = \frac{K_{\text{кп}}}{Э}, \tag{2}$$

where K_{kp} is expenditures for design and introduction of VTsKP.

Let us consider how the value of E_{ek} is determined. The use of a single VTs for several users (organization of cluster VTs) should be provided in the basic version for users having volumes of information to be processed insufficient for full loading of the computer.

The necessary condition for determining the economic effectiveness due to introduction of VTsKP is the comparability of all indices used in the calculation. These indices are determined with regard to the wholesale prices, tariffs and wage rates existing at the moment of calculation. The volume of input information processed in the basic version should be equal to the volume of data to be processed at the VTsKP.

The operating expenses for the basic version and the VTsKP version must be calculated to determine E_{ek}.

The annual operating expenses of an individual or cluster VTs are determined by the formula

$$C_{vts} = C_{zp} + C_{at} + C_{az} + C_{rs} + C_{rz} + C_{el} + C_{ni} + C_{cr} + C_{pr}, \tag{3}$$

where C_{zp} is personnel wages, C_{at} is expenditures for hardware depreciation, C_{az} is expenditures for building depreciation, C_{rs} is expenditures for routine maintenance and upkeep of hardware, C_{rz} is expenditures for building maintenance and upkeep, C_{el} is expenditures for electric power consumption, C_{ni} is expenditures for information carriers, C_{nr} is overhead expenses and C_{pr} is miscellaneous expenses.

Expenditures for VTs personnel wages are calculated on the basis of the number of workers at the center and their average monthly wage with regard to supplementary payments.

Expenditures for hardware depreciation are determined according to existing norms. The general norm of computer depreciation comprises 12 percent of the cost of the machines and the norm of VTs building depreciation is on the order of 2.7 percent of the cost of construction and installation work.

It is indicated in the method that individual and cluster VTs are developed on the basis of using YeS-1022 type computers. According to calculations made at the Scientific Research Institute of the USSR TsSU for a VTs developed on the basis of the YeS-1022 computer, something on the order of 90 persons and a building 1,100 m^2 in area are required.

Expenditures for routine maintenance and upkeep of hardware and auxiliary equipment of VTs consist of expenditures for spare parts, low-value tools, lubricating and polishing materials and so on. Expenditures for building repairs and maintenance include expenditures for heating, water supply, upkeep of the building and territory adjacent to the VTs building and also for routine maintenance of rooms and inventory.

Expenditures for electric power consumption are determined as the sum of expenditures for electric power for production needs and those for electric power used for room lighting. Expenditures for information carriers include those for punch cards, punch tapes, paper tape and magnetic tape (disks) and so on. Miscellaneous production expenditures of VTs include those for routine maintenance of telegraph apparatus, expenditures for detached duty, payment for telephones and mail-telegraph dispatches, maintenance of motor transport and so on.

A sufficiently high load of computer use (the daily computer operating time during "peak" periods should not be less than 14-16 hours) should be provided when selecting the basic variant on the basis of organizing individual or cluster VTs.

The daily computer loading time during "peak" periods (in hours) can be determined by the formula

$$T_{\text{мз}} = \frac{(Q_{\text{вх1}} \cdot \gamma_1 + Q_{\text{вх2}} \cdot \gamma_2 + Q_{\text{вх3}} \cdot \gamma_3) \cdot K_{\text{кн}}}{3600 \cdot N_{\text{рд}} \cdot V_{\text{эвм}} \cdot K_{\text{нз}}}, \qquad (4)$$

where Q_{vkh1}, Q_{vkh2} and Q_{vkh3} are the annual volumes of information to be processed in digital characters of accounting, planning (analytical) and optimization problems, respectively, γ_1, γ_2 and γ_3 are the average number of machine operations required to process a single digital character of entered information of accounting, planning (analytical) and optimization problems, respectively, K_{kn} is the load concentration factor, N_{rd} is the number of working days per year, V_{evm} is computer productivity (operations per second) and K_{nz} is the coefficient of nonproductive computer machine time expenditures.

According to the method of computer selection adopted at the scientific research institute of the USSR TsSU, the values of γ_1, γ_2 and γ_3 may be assumed equal to 500, 5,000 and 20,000 operations per digital character, respectively.

The feasibility of using individual or cluster VTs is determined on the basis of formula (4). The total operating expenses are calculated after determining the number of VTs required for the basic version.

The annual operating expenses for the VTsKP version are the sum of the annual operating expenses related to organization of the VTsKP. Collective-use computer centers in the system of the USSR TsSU are developed on the basis of existing VTs; therefore, the additional operating expenditures required for VTsKP functioning (C_{dkp}) are determined during calculation. These expenditures are determined by the formula:

$$C_{\text{дкп}} = C_{\text{дзп}} + C_{\text{дат}} + C_{\text{даз}} + C_{\text{дрс}} + C_{\text{дрз}} + C_{\text{дэл}} + C_{\text{дни}} + C_{\text{дир}} + C_{\text{кс}} + \\ + C_{\text{дпр}} \qquad (5)$$

where C_{dzp} is the additional expenses for personnel wages of the VTsKP and user terminals, C_{dat} is depreciation of additionally acquired hardware of VTsKP and user terminals, C_{daz} is depreciation of the VTsKP building and the rooms of user terminals, C_{drs} is expenditures for routine repair and maintenance of additionally acquired hardware at the VTsKP and user terminals, C_{drz} is expenditures for repair and maintenance of the VTsKP building and the rooms of user terminals, C_{del} is expenditures for electric power of the VTsKP and user terminals, C_{dni} is expenditures for information carriers, C_{dnr} is overhead expenses of the VTsKP and user terminals, C_{ks} is expenditures for data transmission over communications channels between the VTsKP and users and C_{dpr} is miscellaneous expenses of the VTsKP and user terminals.

Additional expenses for personnel wages of the VTsKP and user terminals (C_{dzp}) are determined as a function of the monthly wage with regard to additional payments. The number of workers of each category at the VTsKP and user terminals is established according to the organizational and staff structure.

The elements of expenditures C_{dat}, C_{daz}, C_{drs}, C_{drz}, C_{del}, C_{dni}, C_{dnr} and C_{dpr} are determined similar to the elements of expenditures given in formula (3).

Expenditures for data transmission over communications channels between the VTsKP and users are determined on the basis of the number of least communications channels without switchboards and the annual lease payment for communications channels and also the number of users working over telegraph (telephone) communications channels and the annual subscriber payment for installation of the user terminal connected to the telegraph (telephone) network with regard to the total working time of users over telegraph (telephone) communications channels and the rate for payment of communications.

The annual saving due to reduction of operating expenses from information processing at the VTsKP compared to the basic version (E_{ek}) is determined after the annual operating expenses of individual and cluster VTs (expenses of the baseline version) and additional annual operating expenses related to organization of the VTsKP (C_{dkp}) are calculated.

The expenditures for design and introduction must be known to establish the expenditure recovery period for design and introduction of the VTsKP. The latter (K_{kp}) includes one-time expenses for design of the VTsKP (K_{pr}) and the additional capital investments required to develop the VTsKP and user terminals (K_{dkp}). The expenditures for design of the VTsKP are one-time expenses for design work to develop it. Additional capital investments for development of the VTsKP and user terminals can be determined by the formula:

$$K_{dkp} = K_{dts} + K_{drs} + K_{dmn} + K_{dsm} \qquad (6)$$

where K_{dts} is expenditures for additionally acquired basic hardware of the VTsKP and user terminals, K_{dvs} is expenditures for additionally acquired auxiliary facilities and equipment of the VTsKP and user terminals, K_{dmn} is expenditures for adjustment and installation of additionally acquired hardware of the VTsKP and user terminals and K_{dsm} is expenditures for construction of the building or re-equipping of rooms for the VTsKP and user terminals.

Expenditures for acquisition of the basic hardware (K_{dts}) are determined according to the established composition of additional hardware for the VTsKP and to the selected composition of the hardware of user terminals. Expenditures K_{dts} also include transport expenses for loading, unloading and transport of hardware.

The expenditures for auxiliary hardware and equipment of the VTsKP and user terminals include expenses for power and energy equipment, measuring apparatus, cooling units and air conditioners and also for equipping repair shops, production equipment and inventory.

The constituent components of additional capital investments are determined from planning documents or from actual expenditures

Example of Determining the Economic Effectiveness of the VTsKP

1. The input data for calculation (conditional). Let us assume that the collective-use computer center was developed on the basis of an existing computer center and was additionally equipped with two type YeS-1033 computers and one type YeS-1022 computer. The characteristics of VTsKP users, additional capital investments for development of the VTsKP and additional annual operating expenses for its functioning are presented in Tables 1, 2 and 3, respectively. The additional operating expenses of the VTsKP are determined on the basis of the number of additional personnel of the center and user terminals equal to 230 persons.

Table 1. Characteristics of VTsKP User

(1) Абоненты	(2) Годовой объем обрабатываемой информации (млн цифровых знаков)	(3) Удельный вес обрабатываемой информации по типам задач			(7) Тип абонентского пункта	Количество обслуживающего персонала на абонентском пункте (8)
		(4) учетные	(5) плановые	(6) оптимизационные		
1	2	3	4	5	6	7
№ 1	38,8	0,8	0,1	0,1	(9) АП-63	3
№ 2	20,2	0,8	0,1	0,1	АП-63	3
№ 3	90,0	0,8	0,1	0,1	АП-63 АП-2	5
№ 4	460,5	0,9	0,1	— (10)	ЕС-7906 ЕС-7920	5
№ 5	325,0	0,9	0,1	—	АП-4	4
№ 6	40,0	0,9	0,1	—	АП-63	3
№ 7	92,4	0,9	0,1	—	АП-2	2
№ 8	220,5	0,9	0,1	—	АП-4 АП-63	5
№ 9	230,0	0,9	0,1	—	АП-4 АП-63	5
№ 10	455,0	0,9	0,1	—	АП-4 АП-63	5
№ 11	280,0	0,9	0,1	—	АП-4	5
№ 12	140,5	0,9	0,1	—	АП-2 АП-63	4
№ 13	30,2	0,9	0,1	—	АП-70	1
№ 14	20,0	0,9	0,1	—	АП-70	1

Key:

1. Users
2. Annual volume of information to be processed (million digital characters)

[Key continued on following page]

[Key continued from preceding page]

3. Specific weight of information to be processed by types of problems
4. Accounting
5. Planning
6. Optimization
7. Type of user terminal
8. Number of maintenance personnel at user terminal
9. AP
10. YeS

Besides management bodies and nonproductive organizations, the VTsKP users include machine building organizations for which the VTsKP solves problems within the framework of automated enterprise management systems (users Nos 8, 9 and 10).

2. Selecting the version of information processing at individual and cluster VTs. The individual and cluster VTs are selected for VTsKP users enumerated in Table 1. Let us assume that the VTs is organized on the basis of using the YeS-1022 computer with productivity of 80,000 operations per second, computer operating time of T_{mz} = 16 hours per day and number of working days of N_{rd} = 330 per year.

The results of calculating the operating expenses of an individual (cluster) VTs equipped with a single YeS-1022 computer with 90 persons among the VTs personnel and with a VTs area of 1,100 m^2 are presented in Table 4. The sample values of the items of expenditures and calculating coefficients presented in Table 5 were used in calculating the operating expenses. Moreover, it was assumed in the calculations that the cost of one square meter of VTs building area (with regard to all the construction and installation work) comprises something on the order of 300 rubles.

Table 2. Additional Capital Investments for Development of VTsKP

Items of Capital Expenditure	Expenditures, rubles
For acquisition of basic hardware of VTsKP and user terminals	5.4 million
For acquisition of auxiliary facilities and equipment of VTSKP and user terminals	500,000
For adjustment and installation of hardware of VTsKP and user terminals	160,000
For construction of VTsKP building and re-equipment of rooms for user terminals	1.4 million
Total	7.46 million

According to formula (4), the volume of calculating work (determined by the number of machine operations) which can be performed by the YeS-1022 computer under the given conditions during the year is

Table 3. Additional Annual Operating Expenses for Functioning of VTsKP and User Terminals

Items of Operating Expenses	Expenditures, thousand rubles
Wage fund (with regard to additional wages and deductions for social insurance)	460
For repair and maintenance of hardware and auxiliary equipment	106
Depreciation of hardware	700
Building depreciation	38
For building repair and maintenance	12
For electric power	12
For information carriers	30
Overhead expenses	184
For lease and maintenance of communications channels	20
Miscellaneous	41
Total	1,603

$$P_{вр} = Q_{вх1}\cdot\gamma_1 + Q_{вх2}\cdot\gamma_2 + Q_{вх3}\cdot\gamma_3 = \frac{T_{мз}\cdot 3600\cdot N_{рд}\cdot V_{эвм}\cdot K_{мэ}}{K_{кп}} =$$

$$= \frac{16\cdot 3600\cdot 330\cdot 80\,000\cdot 0{,}75}{2{,}5} = 4{,}6\cdot 10^{11} \text{ operations.}$$

Provided that the specific weight of accounting problems comprises 0.9 and that of planning problems comprises 0.1, the average number of machine operations for processing a single input digital character is $\gamma^1_{sr} = 0.9\cdot\gamma_1 + 0.1\cdot\gamma_2 = 0.9\cdot 500 + 0.1\cdot 5{,}000 = 950$ operations per character. With this condition, the annual volume of information to be processed on the YeS-1022 computer is

$$Q^1_{вх} = \frac{P_{вр}}{\gamma^1_{ср}} = 4{,}8\cdot 10^8 \text{ digital characters.}$$

Provided that the specific weight of counting problems comprises 0.8, that of planning problems comprises 0.1 and that of optimization problems comprises 0.1, the average number of machine operations for processing a single input digital character is $\gamma^{II}_{sr} = 2{,}900$ operations per character and the annual volume of information to be processed is $Q_{vkh} = 15.9\cdot 10^7$ digital characters.

According to the data of Table 1, let us select individual VTs for user Nos 4 and 10. To process the information of the remaining users, let us provide the use of a single VTs for several users (cluster VTs). It has been established that the number of cluster computer centers is determined by the number of the following groups of users: users Nos 1, 2 and 3 for the first group, Nos 5, 6 and 7 for the second group, Nos 8 and 9 for the third group and Nos 11, 12, 13 and 14 for the fourth group (the user group is selected with regard to agency affiliation and their territorial location). Thus, the basic version will have six computer centers and one YeS-1022 computer each is used at each VTs.

Table 4. Annual Operating Expenses of Individual (Cluster) Computer Center Equipped With YeS-1022 Computer

Items of Operating Expenses	Expenditures
Wage fund (with regard to additional wages and deductions for social insurance)	185,600
For repair and maintenance of hardware and auxiliary equipment	29,700
Depreciation of hardware	86,400
Building depreciation	8,000
For building repair and maintenance	4,100
For electric power	9,000
For information carriers	6,000
Overhead expenses	74,200
Miscellaneous	4,000
Total	407,000

The operating expenses for functioning of the basic version of information processing of VTsKP users at six individual and cluster VTs are

$$C_{вц}=6\cdot C_{вк}=6\cdot 407=2.442 \text{ million rubles.}$$

3. Calculation of the indicators of the economic effectiveness of the VTsKP.

The annual saving due to reduction of operating expenses with information processing of users at the VTsKP compared to information processing at individual and cluster VTs is

$$Э_{эк}=C_{вц}-C_{цкп}=2\,442-1\,603=839 \text{ thousand rubles.}$$

A collective-use computer center solves problems of the automated management systems of three production enterprises of the machine building industry. The annual saving from introduction of automated enterprise management systems (ASUP) is determined by the method indicated above.

Table 5. Sample Values of Items of Expenditures and Calculating Coefficients to Determine Annual Operating Expenses of Computer Centers

Items of Expenditures, Coefficients	Values
Deductions for social insurance	7.3 percent of the personnel wage fund
For routine repair and maintenance of hardware and auxiliary equipment	3 percent of cost of hardware
For building repair and maintenance	3 rubles per m^2
For electric power	0.2 percent of the cost of hardware
For materials	1 percent of the cost of hardware
Overhead expenses	40 percent of the personnel wage fund
Miscellaneous expenses	0.7 percent of the cost of hardware
VTs load concentration factor	2.5
Coefficient of nonproductive expenditures of computer time	0.75

The annual saving comprises an average of approximately 600,000 rubles upon introduction of ASUP at enterprises of the machine building industry. In the given example we shall determine the effectiveness of the ASUP on the basis of the given average vlue of the annual saving from introduction of the ASUP, i.e., we will use the annual saving from solving the problems of ASUP at three production enterprises by improving the quality of management E_{pr} = 1.8 million rubles.

The anticipated annual saving from introduction of the VTsKP is

$$Э = Э_{эк} + Э_{пр} = 839 + 1\,800 = 2\,639 \text{ million rubles.}$$

Let us assume that the expenditures for design of the VTsKP comprise one million rubles (including development of common software). Consequently, the expenditures for design and development of the VTsKP are

$$K_{кп} = K_{пр} + K_{дкп} = 1\,000 + 7\,400 = 8\,400 \text{ million rubles.}$$

The expenditure return period for design and introduction of the VTsKP is

$$T_{ок} = \frac{K_{кп}}{Э} = \frac{8\,400}{2\,639} = 3.2 \text{ years.}$$

The coefficient of the effectiveness of expenditures for design and development of the VTsKP is

$$E_{kp} = \frac{1}{T_{ok}} = \frac{1}{3.2} = 0.31$$

The normative coefficient of the effectiveness of capital investments for introduction of computer technology into the national economy is taken as $E_n = 0.3$ in the calculations. The coefficient of the effectiveness of expenditures found for design and development of the VTsKP exceeds somewhat the normative value of E_n and consequently, according to the condition $E_p > E_n$, the developed VTsKP is efficient.

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A COMPLEX OF INTERACTIVE MODELING OF THE TOPOLOGY OF COMMUNICATION IN LARGE TERRITORIAL COMPUTER CENTER NETWORKS WITH REGARD TO RELIABILITY

Moscow UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan-Feb 81 pp 20-25

[Article by Candidate of Physicomathematical Sciences V. A. Gadasin, VNIIPOU]

[Excerpts] Optimizing the topology of communication is one of the problems encountered in determining the basic technical characteristics of large territorial computer center networks. A general description of a unified system of mathematical models intended for optimum selection of network characteristics is given in (1) with a state network of computer centers as an example. That paper also demonstrates that the topology (structure) of subscriber and intercenter communication in large networks may be optimized for a fixed distribution of network facilities in relative isolation from other problems. This solution is proposed in relation to both the separate task of optimizing topology, and iterative improvement of a network's characteristics.

The basic features of a complex of interactive models used in optimizing the topology of large redundant communication networks are examined in the present paper. Redundant communication channels are added to a network basically due to consideration, in the course of optimization,of probability criteria reflecting parameters of the network's reliability and viability.

A large number of papers have been devoted to optimizing the topology of communications (2-8). A dialog system for optimizing the topology of centralized computer center networks is examined in (9). The complex described in that paper is intended for use in designing large networks (possessing up to 500 facilities and 1,000 channels). Therefore a number of special compact topology optimizing algorithms employing both determined and stochastic criteria were developed for the complex.

The principles of the complex's design: Let us examine the task of optimizing the topology (structure) of subscriber and intercenter communication in computer center networks. The basic characteristics are as follows:

large size (an intercenter network contains 100-500 facilities, and a subscriber network contains $5\cdot10^3$-$10\cdot10^3$ terminals);

presence of a large number of criteria;

a lack of raw data of the required reliability;

indefiniteness of a number of requirements and principles of network design;

high cost of solutions presently being implemented.

These factors inevitably make mathematical modeling necessary, since it allows us to consider a large number of parameters, and examine different alternatives for the network's design with the goal of selecting the best. Naturally, considering the indefiniteness of the design requirements and principles, this choice may be made only on the basis of informal criteria--that is, to solve the problem, we would need to create an interactive complex of mathematical models making quick computation of network parameters in several variants with the use of various possible criteria possible. The sum total of the results obtained from simulation make up a learning sequence permitting us to work out the calculation methodology, develop substantiated requirements, and formulate our ideas on optimum configuration.

Communication topology is optimized in relation to a fixed distribution of facilities--a time-sharing computer center and subscriber terminals. It is demonstrated in (2, 4) that in this case the configuration of the intercenter network would not depend on the configuration of the subscriber network, and that the basic problem breaks down into two corresponding subproblems.

A subscriber network is typified by centrifugal information flow from subscriber terminals to the time-sharing computer center. A similar situation is inherent to an intercenter network in the initial stages of its development, when communication with one of the poles of the network must be organized (such as in the case of the link between Moscow and the state network of computer centers). It is demonstrated in (10) that in such cases, the optimum configuration, as defined by almost all optimization criteria encountered in practice, is in the class of dendritic structures, a class permitting both a centralized (star) and decentralized (diffuse) topology. Dendritic structures are nonredundant, they are the simplest to design, their optimization requires a minimum of raw data, and therefore use of this class of structures is the most preferable. The found structure is interpreted as a preliminary structure, and in the future it is supplemented by redundant channels as the network approaches its full volume.

The developed interactive complex can be used to improve the configuration of a communication network containing up to 500 facilities and up to 1,000 communication channels. The complex is written in PL/1, and it is intended to be run in type 4.0 and 4.1 YeS OS computers. The catalog, which contains about 35 programs, and which is organized on a disk following translation, requires a memory of about 150K bytes. Optimization of a network consisting of 100 facilities using a YeS1040 computer would require a functioning memory of about 100K bytes, and the time for adding or subtracting one optimum branch varies from 0.5-1 minute for determined criteria, to 7-10 minutes for stochastic criteria. The total computer time for a network of about 100 facilities is 3-5 hours. In the NET package, all programs are in a single library of magnetic disks, and program interaction is controlled automatically.

Computations used to design the topology of subscriber and intercenter communication links in the state network of computer centers were made with the help of the complex described above.

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BATCH TELEPROCESSING SOFTWARE FOR A SUBSCRIBER COMPUTER NETWORK

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan-Feb 81 pp 71-73

[Article by Engineer G. S. Serykov, Special Design Office for MMS, Institute of Cybernetics, Ukrainian SSR Academy of Sciences]

[Text] One of the typical operating modes of modern computers is batch teleprocessing. Thus, for example, 65 percent of the load handled by seven processors in the regional computer center of General Electric (USA) is handled in this mode, 25 percent is handled in local batch processing mode, and 10 percent is handled in time-sharing mode.*

In our country, the universal transition to creation and use of time-sharing computer centers, including telecommunication resources, is a precondition for creation of batch processing subscriber networks.

Software for a typical unit of such a network, including the network's central computer, represented by one of the highest-capacity YeS computer models, and a subscriber terminal, represented by one of the smaller YeS computer models, are described below. The software supports batch teleprocessing of jobs submitted by the subscriber terminal. Two software subsystems were developed in accordance with the functional composition of the typical unit described above: A package of remote job input (UVZ) programs for the central computer, and a program supporting remote job input for the subscriber terminal (UVZ AS).

Architecture of a Typical Batch Teleprocessing Unit

A typical unit includes the following hardware (see figure):

A central computer and associated data transmission hardware;

a subscriber terminal with its data transmission hardware;

a telephone communication channel connecting the subscriber terminal to the central computer.

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*Heil, Stephen, W., "One Approach to the Management of Computer Performance Data," EDP PERFORM. REV., Vol 7, No 1, 1979, pp 1-10.

The choice of communication channels for this unit of the network depends on the number of subscriber terminals connected to the computer and on teleprocessing communication time. A noncommutable (reserved) communication channel connects the central computer to the subscriber terminal over an extended period of time. When a commutable communication channel is employed, the central computer and the subscriber terminal are connected together in accordance with a principle similar to that associated with a telephone call. The number is dialed at the central computer or at the subscriber terminal, and the called terminal is connected manually or automatically. This depends on the possibilities of the terminal equipment.

In both cases data are exchanged through the communication channels in semiduplex mode, using a synchronous transmission method.

Either one or several subscriber terminals can be connected to one central computer--that is, multiple collective access may be achieved.

The number of subscriber terminals that may be serviced by a UVZ package depends on the productivity of the central computer, the capacity of the main memory, and the capacity of the NMD [magnetic disk memory]. The UVZ package works with a model 6.1 OS YeS computer, and it allows users at subscriber terminals (remote users) to feed jobs into the input traffic flow of the central computer for planning and execution. After the job is completed, the result is transmitted back to the remote user. A UVZ package also forms, and transmits to the subscriber terminal, messages to the operator and the remote user.

The remote user controls the operating mode and the individual steps of the UVZ package with the help of instructions fed in at the subscriber terminal, separately or alternately between jobs.

The UVZ AS program operates with all OS Yes computer models, and it exists as an interface between the remote user and the UVZ package--that is, it transmits jobs and instructions to the latter, and it feeds jobs and messages to the subscriber terminal output.

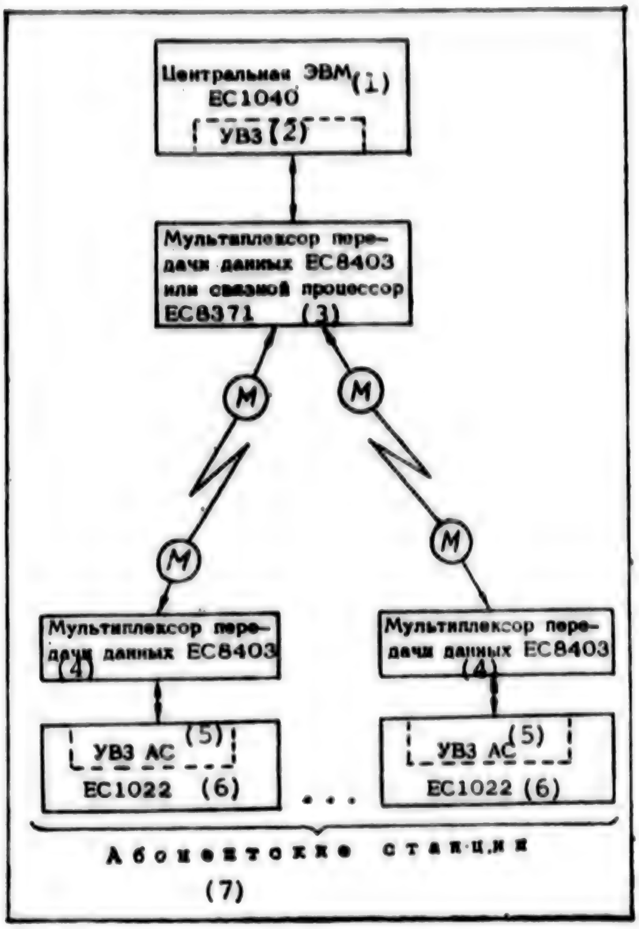
States of the Subscriber Terminal

The UVZ package is started up at the central computer by the appropriate cataloged procedures irrespective of the state of all subscriber terminals. A UVZ AS program is started up at each subscriber terminal independent of the others. The start-up of this program culminates with display of the following message on the operator's console:

```
  (1)           (2)         (3)
ОПРЕДЕЛИТЕ  ИСТОЧНИК   ВВОДА
ПК (4)          НМД (5)   НМЛ ПМ(6)
```

Key:

1. Determine
2. Source
3. Of input
4. PK
5. NMD
6. NML PM


Центральная ЭВМ (1)
ЕС1040
УВЗ (2)
Мультиплексор передачи данных ЕС8403 или связной процессор ЕС8371 (3)
M
M
M
M
Мультиплексор передачи данных ЕС8403 (4)
Мультиплексор передачи данных ЕС8403 (4)
УВЗ АС (5)
ЕС1022 (6)
УВЗ АС (5)
ЕС1022 (6)
. . .
Абонентские станции
(7)

Architecture of a Typical Batch Teleprocessing Unit, *M*--Models YeS8010

Key:

1. Central YeS1040 computer	4. YeS8403 data transmission multiplexer
2. UVZ	5. UVZ AS
3. YeS8403 data transmission multiplexer or YeS8371 intermediate processor	6. YeS1022
	7. Subscriber terminals

The operator determines the querried source by inputting one of four possible responses for the UVZ AS at his console:

PK--jobs and instructions will be fed in with punchcards;

NMD--jobs and instructions will be fed in with magnetic disks;

NML--jobs and instructions will be fed in with magnetic tapes;

PM--further work of the subscriber terminal operator will be similar to work at a OS YeS-controlled console.

After one of the responses is received, PK, NMD, or NML, the program immediately inputs the package of subscriber terminal jobs and instructions from the appropriate facility (the package at the facility must be prepared beforehand with a OS YeS computer, or with a DUVZ [not further identified] package), and it interacts with the UVZ package in the central computer. After input is completed, the next package of the input facility may be changed.

The interaction procedures depend on the state of the computer terminal at the given moment--inactive, active, or operational. The central computer assesses the state of the subscriber terminal in order to determine the sort of communication permitted with it. When there are several subscriber terminals, all three states may be represented simultaneously; however, at each given moment in time, each subscriber terminal may only be in one of them. Change of state is controlled by the subscriber terminal itself with the help of subscriber terminal instructions transmitted to the central computer which, following receipt of instructions for a permissible change in state, logs this change in. Impermissible requests for change in state are not satisfied, and a message reporting the error is transmitted to the querrying subscriber terminal.

After the UVZ package and the UVZ AS programs are ready to go, the central computer is ready to service the subscriber terminal. At this moment all subscriber terminals are in inactive state.

A subscriber terminal in inactive state (an inactive subscriber terminal) is logically disconnected from the UVZ package. The central computer initiates no transmission of data to the terminal. The only instruction it can accept from an inactive subscriber terminal is RJSTART, which activates the subscriber terminal, and it throws out all other instructions, reporting an error to the terminal in this case. A subscriber terminal in active (an active subscriber terminal) or in operational state (an operational subscriber terminal) becomes inactive following transmission of the instruction RJEND.

Active subscriber terminals are logically connected to the UVZ package--that is, they may initiate any subscriber terminal output. A subscriber terminal output is any output (official reports to the system operator) sent to the subscriber terminal and not depending on whether or not a remote user is working with the subscriber terminal at the present moment.

If the UVZ package receives the instruction LOGON from the UVZ package, the subscriber is logically connected to it, and the subscriber terminal itself assumes its operational state. If the UVZ package receives a permissible LOGOFF instruction from an operational subscriber terminal, the user is disconnected from the UVZ system and the subscriber terminal once again becomes active. The central computer receives only the instructions LOGON, RJEND, or CONTINUE from an active terminal. Any other input is declined, and an error signal is transmitted to the subscriber terminal.

The UVZ package accepts any input from an operational terminal--that is, all jobs and instructions of the subscriber terminal, to include instructions altering the state of the subscriber terminal; it also transmits, to a subscriber terminal, any information intended for the remote user (for the user's output)--for example the results of job completion, and routine messages.

The user's output is activated only when the subscriber terminal is not transmitting data at the given moment.

Information Transmitted From a Subscriber Terminal to the UVZ Package

A package transmitted from a subscriber terminal consists of the subscriber terminal's jobs and instructions. Jobs are written out in accordance with OS YeS rules. Moreover they may be accompanied by the nonmandatory instruction JED, which transmits to the UVZ package certain additional information associated basically with the mode in which the results of a job are transmitted.

The name of the job (given according to OS YeS rules) is registered by the UVZ package, which permits the remote user to obtain the job result, information on the job's progress, and so on by transmitting the appropriate instruction. The UVZ package requires unique names for all jobs. If a remote user attempts to enter a job with a name that has already been recorded in the package, the job is declined, and appropriate message is transmitted to the user.

When a DVUZ system is operated at the subscriber terminal, the remote user employs a display to compose a job using the NMD. The job is transmitted to the central computer in response to the instruction SUBMIT, containing the name of the appropriate set of data. After the job is completed, the result is transmitted to the output of the DUVZ. The remote user may then review the obtained data on his display.

The subscriber terminal controls interaction with the UVZ package by means of the following instructions:

RJSTART--connect the subscriber terminal to the UVZ system;

RJEND--disconnect the subscriber terminal from the UVZ system;

LOGON--connect the user to the UVZ system;

LOGOFF--disconnect the user from the UVZ system;

OUTPUT--read out the indicated jobs;

CONTINUE--continue an interrupted read-out;

DELETE--delete a given job or jobs from the UVZ system;

ALERT--request a signal of job completion;

STATUS--submit a status report on the job;

BRDCSTR--obtain information on the system's status from the central system;

MSGR--transmit a message to another subscriber terminal or to the central operator.

Employing these instructions, the user may control interaction between the UVZ package and the subscriber terminal--that is, he may transmit a job read-out to another remote user or to the read-out units of the central computer; interrupt read-out and resume it later; print out the job in specific formats stored in the computer terminal libraries.

A job read-out includes messages produced by the system on the results of job completion, and the output data created by the job. On being returned to the returned user, the output data must be accompanied by the instruction SYSOUT. The subscriber terminal to which the read-out is returned is defined by the class represented by the key word SYSOUT. Microinstructions used in the generation of the UVZ package permit coordination of remote SYSOUT classes with the classes used in the central computer. Thus if the central printing unit is usually represented by class A, then the UVZ system is generated in such a way that the class of jobs submitted from a subscriber terminal would cause the output to be transmitted to the subscriber terminal's printer.

The UVZ package permits data read-out by the subscriber terminal's printing and punchcard units. A job submitted from a subscriber terminal may create not more than 24 sets of SYSOUT data to be returned to the subscriber terminal.

Messages concerning job control, including diagnosis, are always read out at the subscriber terminal.

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[135-11004]

11004
CSO: 1863

LATVIAN SSR DATA BANK, TELEPROCESSING NETWORK PROBLEMS DISCUSSED

Riga SOVETSKAYA LATVIYA in Russian 3 Sep 80 p 2

[Article by E. Yakubaytis, Latvian SSR Academy of Sciences vice-president: "Information in the National Economy"]

[Excerpts] For the purpose of creating standard data banks it is practically not necessary to write any programs, for all operations relating to the control of information are performed by standard systems of programs. For example, the creation of large data banks with complex dialogue information retrieval and reference services employing YeS [unified series] computers is made possible by a software system called the OKA. The software system called the DIAMS is designed for organizing small data banks (employing SM-4 minicomputers). Each of these systems makes it possible to gather data from user stations, to store data, to retrieve data upon inquiry and to output data to user stations. Furthermore, both in the OKA and the DIAMS systems the information has protection from unsanctioned access to it and from unauthorized use of it. Dozens of user stations can work simultaneously with the same DIAMS data bank, and even hundreds with an OKA bank.

The creation of modern data banks is no easy problem, involving the installation of additional equipment and communciations channels and the training of personnel. Even more difficult is the psychological adjustment of production workers and management personnel who have been accustomed to work with compilations of statistical data, information and tables received by mail or telegraph.

The first modern data bank with teleprocessing in our republic was created by the Latvian SSR Gosplan Scientific Research Institute of Planning. In this bank is all the information necessary for solving problems relating to planning and controlling housing construction in the republic, the construction of animal husbandry quarters and other projects. Realization of the major functions of planning, operations control and supervision is made possible by a data bank containing calendar plans for work production and deliveries, as well as data on the demand for basic construction materials.

It should be mentioned that because of the limited inventory of standard software an ever greater number of programmers at computer centers, design bureaus and institutes has been developing the required software. A similar tendency has begun to be observed also in the creation of data banks. And this is completely unacceptable. If data banks appear in our republic which operate with different languages and methods of interacting with users and with various formats, then their combined functioning in Latvia's RASU [republic automated control system] and interaction with the same user stations will become practically impossible. Approximately the same picture would originate in the telephone system if each user himself began to devise a telephone equipment system and did not pay attention to the standards used in this network.

Therefore a highly important objective relating to the development of Latvia's RASU and the creation of data banks in it is the introduction in the Latvian SSR of obligatory standards for all organizations as far as data processing is concerned. For the next few years they have been based on the software systems called the OKA and DIAMS.

The TsSU [Central Statistical Administration] Computer Center, the Latvian SSR Academy of Sciences Institute of Electronics and Computer Technology, the Central Scientific Research Institute of the ASU [Automated Control System] for Civil Aviation, and a number of other organizations have already begun the mastery of the standard system of OKA data banks. A standard DIAMS data bank is in operation in one of the hospitals in Riga. However, the scale and pace of the creation of standard data banks are clearly inadequate.

The creation of standard data banks with a ramified data teleprocessing network is a new trend in which the necessary experience is almost lacking in the republic. Therefore it is advisable to speed up work on the creation of leader banks on whose basis it is necessary to accomplish the extensive training of personnel and the obtaining of skills in the technology of processing data under new conditions. [70-8831]

8831
CSO: 1863

PERSONNEL RESISTANCE, EQUIPMENT AND SOFTWARE SHORTAGE PLAGUE AUTOMATION EFFORTS

Moscow EKONOMICHESKAYA GAZETA in Russian No 41, 1980 p 8

[Article by Vladimir Andreyevich Spirin, Khimvolokno Association director, Chernigov: "Effectiveness of Using Automated Systems"]

[Excerpts] The introduction of an automated control system plays a major role in the utilization of production potential. Association Director Vladimir Andreyevich Spirin's article is devoted to this topic. He began his working career 30 years ago after finishing at the Ivanovo Chemical Technology Institute. He was a shift foreman and worked at a number of the industry's enterprises. Since 1974 he has been director of the Chernigov Khimvolokno Association.

Our enterprise began to introduce an automated control system eight years ago. Not a long time, but more than a little has been done. Now by means of computers we solve 140 problems embracing all aspects of business operations. The total savings from introducing an ASU [automated control system] is greater than 1.5 million rubles per year. The expenses of creating the IVTs [computing and data processing center] and of mastering the system were paid back in 18 months. Meanwhile, even relatively recently, in introducing the ASUP [automated enterprise management system], it was necessary to surmount a peculiar psychological barrier.

Conducive to surmounting the psychological barrier were the purposeful explanatory work of the administration and party organization and the training of all management personnel--from foremen to leading specialists of association services.

However, in spite of serious training it cannot be said that the "barrier" has been completely surmounted. In various forms underestimation of the new methods is evidenced even today in individual sections.

Now regarding problems of extending the range of application of the ASUP. Enterprises of various industries have experienced a shortage of external equipment for the remote gathering and transmission of data. The problem is not a new one. It has arisen more than once at various all-Union conferences. Its solution, however, is being dragged out. It is desirable that the USSR State Committee for Science and Technology and the Ministry of Instrument Making, Automation Equipment and Control Systems take the necessary measures.

Limited for us, too, is the number of institutes to which enterprises can turn for the development of projects for the support of modern third-generation computers--the YeS-1022's. At the same time some institutes gladly continue to issue documentation for "Minsk-32" computers which have "disappeared from the scene." And here inferences regarding the authoritative intervention of the USSR State Committee for Science and Technology suggest themselves.
[70-8831]

8831
CSO: 1863

PROBLEMS OF ASU ENGINEERS

Yerevan KOMMUNIST in Russian 11 Jul 80 p 2

[Article by L. Nersesyan, chief of the Section for Introduction of Computer Technology and Automated Control Systems, Armenian SSR Gosplan, and S. Zakhar'yan, head of the Automated Control Systems Department, Yerevan Polytechnic Institute, associate professor]

[Excerpts] The present article deals with a new and promising sector. Our republic is experiencing an acute need for engineers with the specialty "automated control systems." This is indicated even by the fact that the acceptance of students for that specialty is constantly increasing. At the same time the specialty is young. At many enterprises the corresponding sections and laboratories are just being formed and cannot be provided with qualified leadership of the growth and establishment of a production engineer. A young specialist who comes to such an enterprise encounters a mass of problems which he cannot overcome alone. As a result, as the facts show, many graduates in this acutely deficit specialty are being requalified, as it were are being dissolved in the medium of traditional occupations.

Last year the Automated Control Systems Department of Yerevan Polytechnic Institute imeni Karl Marx jointly with the Section for Introduction of Computer Technology and Automated Control Systems of the Armenian SSR Gosplan prepared and distributed to enterprises of the republic a questionnaire in which the managers of enterprises were asked about graduates with the specialty of automated control systems during the last 3 years.

The results of the survey, which represents an effective form of feedback in the system institute-enterprise, showed that among production people there have been many comments about the preparation of engineers with the given specialty. In replies to questions of the questionnaire there were requests that graduates' knowledge of theoretical principles of the automated control of technological processes and enterprises, information provision and specific economics be improved and that practical skills in work with computers and in compiling programs be widely inculcated.

Unfortunately, at a number of enterprises there is an irresponsible attitude toward the selection of the theme of the thesis and subsequent

guidance of the work of the holder of a diploma. At times either excessively general questions have been proposed for them, for example, the creation of an entire sector automated control system, or excessively narrow tasks. As a result of joint discussion with the rperesentatives of enterprises, such themes have been modified or rejected. It has been decided to unify several persons holding diplomas who are working on a large and important problem into a single collective, with subsequent preparation and defense of complex theses.
[401-2174]

2174
CSO: 1863

HYDROMETEOROLOGICAL DATA PROCESSING IN UZBEKISTAN

Tashkent EKONOMIKA I ZHIZN' in Russian No 3, 1930 p 58

[Article]

[Excerpt] For over 10 years in the Administration for Hydrometeorology and Monitoring the Environment of the Uzbek republic much work has been done on the introduction of computer technology and the automation of hydrometeorological data processing.

N. N. Aksarin, manager of the administration, reported on the results of that work at the regular session of that republic's Interdepartmental Council for Questions of Improvement of National Economic Management.

The technical base of complex automation of the hydrometeorological service is the Central Asian Regional Computer Center, which has at its disposal a pool of seven second- and third-generation computers. On the basis of a "Vesna" computer and two "Minsk-22" machines a program-apparatus complex functions in the collection and processing of information obtained over the communications channel. Facsimile and teletype apparatus and "Digigraf" line-drawing equipment are used for data input and output. About 60 units of perforating and computing equipment are used to prepare programs and starting data and apply them on technical carriers.

The useful loading of a computer is 19-21 hours per day, which is higher than the set All-Union standards.

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CSO: 1863

THE 'KADRY' SUBSYSTEM IN STEAMSHIP COMPANIES

Moscow MORSKOY FLOT in Russian No 2, 1980 p 13

[Article]

[Excerpts] The computing and data processing center of the Baltic Steamship Company has developed and put in operation eight complexes of tasks of the "Kadry" subsystem of the steamship company automated control system. Automated data processing completely confirmed the advisability of keeping records of and analyzing the work of personnel.

In the steamship company information on the personnel of the fleet and the staff ashore is processed by that subsystem. A portion of the subsystem (personnel of ships' crews) is successfully functioning in the Black Sea, Azov, Caspian, Georgian and a number of other steamship companies. In some of them, the Estonian, Lithuanian and Arctic, they have also started to process data on the land-based staff with the "Minsk-22" computer.

Introduction of the subsystem into the "Minsk-32" computer is a good experiment and the first stage in the creation and further development of the subsystem, especially if one takes into consideration the in-progress first equipment of the computing and data processing center with new equipment--third-generation machines.

The information subsystem of "Kadry" is planned in the composition of the following data bases: "SOTRUDNIK" contains data on each worker. In the first stage in the record on personality up to 200 indicators are included, the list of which can be supplemented and varied. "PODRAZDELENIYE" contains generalized data on personnel on the scale of the structural subdivisions of the shipping company on all levels of management. "ARKHIV" contains little-used indicators and long-stored data on workers, and also generalized data on structural subdivisions.

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2174
CSO: 1863

BRIEFS

YES-1060'S INSTALLED--Two YeS-1060 computers have been installed at the Moscow Railroad Computer Center. The switch to the third-generation computers, the hardware basis for the Ekspress-2 ticket reservation system, will allow the number of ticket outlets to increase from 800 to 2000 and will permit reservations to be made up to 63 days in advance as opposed to the current 10 day limit. Trial testing is scheduled for the middle of 1981. [Summary] [Moscow GUDOK in Russian 10 Sep 80 p 4]

YEARLY SAVINGS--An automated control system on the Central Asian Railroad, which utilizes an YeS-1022 computer, produces a yearly savings of 915,000 rubles. [Summary] [Tashkent PRAVDA VOSTOKA in Russian 29 Jul 80 p 3]
[911-P]

CSO: 1863

PUBLICATIONS

ABSTRACTS FROM THE JOURNAL 'CONTROL SYSTEMS AND COMPUTERS'

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 1, Jan-Feb 81 pp 145, 147, 149, 151

UDC 681.3.05

ANALYSIS AND SELECTION OF INDICATORS FOR EVALUATION OF COMPUTER OPERATION EFFICIENCY

[Abstract of article by A. F. Kondrashev, A. Ye. Fateyev, Ya. A. Kogan, and S. M. Porotskiy]

[Text] The problems of evaluating the efficiency of computer operation associated with batch job processing are examined. Different indicators intended for evaluation of computer loading and determination of payments for the use of computer time are subjected to comparative analysis. The suitability of using the "generalized degree of equipment loading" indicator is substantiated. Bibliographic references--7.

UDC 681.3.05

DETERMINATION OF THE COST OF DATA PROCESSING WITH A COMPUTER IN MULTIPROGRAMMING MODE

[Abstract of article by A. R. Myagi]

[Text] Eight algorithms for distributing the total cost of data processing among users of a computer in multiprogramming mode are examined. The basic principles of establishing the rates for computer center services are analyzed. Bibliographic references--10.

UDC 681.325

AUTOMATIC CONTROL SYSTEMS FOR TRADING ENTERPRISES

[Article by Yu. A. Belyayev]

[Text] The possibility, necessity, and economic feasibility of creating and beginning industrial series production of automatic control systems for public trading facilities are substantiated. The conception, content, purpose, and principles of the techniques for creating series-produced automatic control systems for trading enterprises are examined. Initiation of the experimental stage in creation of automatic trading control systems is proposed. Bibliographic references--4.

UDC 681.3.01

A COMPLEX OF INTERACTIVE MODELING OF THE TOPOLOGY OF COMMUNICATION IN LARGE TERRITORIAL COMPUTER CENTER NETWORKS WITH REGARD TO RELIABILITY

[Abstract of article by V. A. Gadasin]

[Text] The principal features of organizing a complex of interactive models with which to optimize the topology of large redundant communication networks are examined. The optimization criteria and methods employed are presented. A package of applied programs developed with the purpose of optimizing communication networks with regard to both determined and stochastic criteria is described. Bibliographic references--21.

UDC 681.31

ANALYSIS OF THE NATIONAL SPANISH DATA TRANSMISSION NETWORK, WITH PACKAGE SWITCHING--THE RETD

[Abstract of article by Yu. A. Mikheyev, L. M. Gvozdeva, and L. I. Ivanushkina]

[Text] The structure and characteristics of the RETD network are examined, quantitative data on its basic parameters and a list of the services offered by the network are presented. The network's switching equipment is described, and the applications of the RETD network are examined. Figures--3.

UDC 681.322.2

MULTIMICROPROCESSOR ARCHITECTURE OF COMPUTER SYSTEMS PERMITTING DIRECT INTERPRETATION OF HIGH-LEVEL LANGUAGES

[Abstract of article by K. L. Boyanov and V. S. Kisimov]

[Text] A new approach to designing the multimicroprocessor architecture of computer systems permitting direct interpretation of high-level languages, based on pipeline organization, is proposed. The concept "constructive unit with microprocessor organization"--KEMPO--is introduced. A block diagram of a processor with the suggested architecture, and the modeling of concrete computer systems are examined. Figures--3.

UDC 681.3-/-9

MULTIPURPOSE EMPLOYMENT OF MEMORY LSI CIRCUITS IN DATA TRANSMISSION NETWORK MICROCOMPUTERS

[Abstract of article by Ye. P. Balashov, V. F. Nesteruk, and D. V. Puzankov]

[Text] An approach to increasing the operational capacity of a data transmission network microcomputer through multipurpose employment of memory units is examined. The functional possibilities of the immediate-access memory are analyzed. The structure of a module that transforms the word formates of the data and establishes the priority of service requests is given. Figures--2; bibliographic references--5.

UDC 681.3.653

EVALUATION OF THE EFFICIENCY OF COMPUTER INSTRUCTION SYSTEMS

[Abstract of article by A. F. Kurgayev and A. V. Pisarskiy]

[Text] Problems associated with determining the parameters of a computer instruction system with a consideration for the class of problems are examined, as are the problems associated with computer choice in the development of automation systems. Bibliographic references--5.

UDC 62-52.019.3

THE POSSIBILITIES FOR USING A DIFFUSE DISTRIBUTION TO EVALUATE HARDWARE RELIABILITY ON THE BASIS OF TEST RESULTS

[Abstract of article by V. P. Strel'nikov]

[Text] Use of a diffuse distribution following from analysis of the kinetics of physical deterioration of hardware components is proposed as a theoretical model for the distribution of hardware failures. Its advantage over an exponential distribution is demonstrated. Figures--1; tables--2; bibliographic references--8.

UDC 681.326.7

PURPOSEFUL FAULT LOCATION IN PROBABILITY-BASED SYSTEMS FOR DIAGNOSIS OF DIGITAL HARDWARE

[Abstract of article by A. M. Romankevich]

[Text] Expansion of the set of parameters employed in probability-based diagnostic systems by the addition of conditional probabilities is suggested. It is demonstrated that conditional probabilities remain unchanged in properly working circuit areas, which makes it possible to perform purposeful trouble-shooting in feedback circuits. Figures--3; bibliographic references--3.

UDC 681.3.01

PROBLEMS ASSOCIATED WITH HASTENING FAULT ANALYSIS IN THE PLANNING OF LSI CIRCUITS

[Abstract of article by E. M. Raskina, L. I. Shapiro, and Yu. I. Shenderovich]

[Text] Ways for hastening simulation of faults, reducing their number, and organizing sensible fault simulation procedures are examined, and the possibility for reducing fault analysis time by several orders of magnitude is demonstrated. Tables--3; figures--5; bibliographic references--2.

UDC 681.31

CODING OF ELECTRICAL CONNECTIONS IN THE BASIC DIAGRAMS OF STANDARD EXCHANGE PACKS IN AUTOMATED SYSTEMS DESIGNING THE TOPOLOGY OF PRINTED CIRCUIT BOARDS

[Abstract of article by V. V. Gusak, V. V. Koloskov, T. M. Prisakar', and L. M. Skobov]

[Text] A method is proposed for automatically preparing data on electrical connections with a coordinatoscope in an automated system designing the topology of printed circuit boards. In this method, no additional requirements are imposed on the blueprints in terms of drawing quality. Figures--2; bibliographic references--11.

UDC 681.32

MICROCOMPUTER-AIDED SOLUTION OF FREQUENCY DISTRIBUTION PROBLEM

[Abstract of article by A. D. Kaluzhskiy]

[Text] Problems associated with the distribution of the operating frequencies of concurrently working electronic facilities are examined, a system of indicators defining the interplay of electronic facilities is proposed, and an algorithm for choosing the operating frequencies of radio transmitters and radio receivers is suggested. Figures--1; bibliographic references--6.

UDC 681.322

A PARAMETRIC SYSTEM FOR PLANNING THE SOFTWARE FOR REAL-TIME SYSTEMS

[Abstract of article by V. G. Akulovskiy, V. G. Kudrin, and T. N. Terent'yeva]

[Text] A parametric system for automating the programming of micro- and minicomputers is proposed. The requirements imposed on such a system and its possibilities are described, and its block diagram is presented. The possibilities for simulating a real-time object with a technological computer are examined. Figures--2; bibliographic references--9.

UDC 681.32

ORGANIZATION OF COMMUNICATION BETWEEN PROGRAMS WRITTEN IN DIFFERENT LANGUAGES

[Abstract of article by N. I. Pelipenko]

[Text] The basic causes of incompatibility between programs or subprograms written in different languages within a single unifying program are examined. A CNNCT subprogram is described, and recommendations are given on its practical use as a means for uniting, within a single program, a set of borrowed programs and subprograms written in different languages, without their substantial modification. Figures--1; bibliographic references--3.

UDC 681.3.053

THE MACROCOMPILER

[Abstract of article by B. N. Malinovskiy and Ye. A. Taran]

[Text] A programming system which combines the properties of a macroprocessor and a compiler is described. The system affords the user a possibility for creating new programming languages in accordance with the scheme traditional to macroprocessors. Variables used in these languages may have a rather complex structure.

UDC 681.326.3

BATCH TELEPROCESSING SOFTWARE FOR A SUBSCRIBER COMPUTER NETWORK

[Abstract of article by G. S. Serykov]

[Text] The software for subscriber batch teleprocessing networks is described. The architecture of a typical batch teleprocessing unit, a package of programs for remote job input, and the operating modes employed by the users of a subscriber network are examined. Particular features of the software's use are presented. Figures--1; bibliographic references--1.

UDC 681.32

RESOURCES FOR DESCRIBING AN INTERACTION LANGUAGE WHEN PLANNING INTERACTIVE GRAPHIC SYSTEMS

[Abstract of article by V. V. Manako and A. I. Nikitin]

[Text] The principles of developing a general-purpose interactive graphic medium--a hardware-software complex that maintains graphic dialog according to a single "script"--are proposed. When these principles are satisfied, the resulting interactive graphic systems meet most of the known requirements. Bibliographic references--6.

UDC 681.3:51

PL/1 PROGRAMS USED IN DATA PROCESSING PROBLEMS

[Abstract of article by R. F. Balodis]

[Text] A PL/1 subset intended for data processing problems is described. The applicability of this subset is evaluated on the basis of an analysis of real automated control system programs, and recommendations on the use of some PL/1 programs are given. Tables--2; bibliographic references--7.

UDC 681.145

TABLE-LANGUAGE DESCRIPTION OF WRITTEN TEXTS HAVING COMPLEX STRUCTURE

[Abstract of article by A. I. Podkovyrov]

[Text] An examination of different methods for describing written texts is used as a basis for proposing a table-language description for the titles and headlines of enterprise automated control system documents; the proposed description is similar to natural language and free of many of the conventions of programming origin. Bibliographic references--19.

UDC 681.3.06

A MODERNIZED RELATIVE LOADER FOR THE MAIN CONTROL SYSTEM OF M6000 COMPUTER COMPLEX

[Abstract of article by V. I. Cherkasskiy]

[Text] The limitations of the standard relative loader of the M6000 computer complex, revealing themselves when the control system software is set up on the basis of the main control system, are examined. A variant of the relative loader that enhances the functional capabilities of the standard program and increases the efficiency of the main control system's use is proposed. Bibliographic references--3.

UDC 681.3.31

AUTOMATED DOCUMENTATION SYSTEM

[Abstract of article by M. M. Khaykin, A. L. Levin, and A. A. Ratnovskiy]

[Text] The unique features and operating principles of a system permitting automation of the writing of program documents are presented. This system may be used independently, and it can be used with the inclusion of an input language into the programs and generalized macrodefinitions. In the latter case we have a completely automated program documentation system. The system developed by the authors is compared with IBM's "Flowchart" system. Tables--1; Figures--1.

UDC 681.3.02

SOME PROBLEMS IN THE TECHNOLOGY OF DEVELOPING AUTOMATED INFORMATION PROCESSING SYSTEMS RELYING ON A BANK OF ALGORITHMS AND PROGRAMS

[Abstract of article by B. K. Rossov, V. A. Gordiyenko, and V. A. Mikhaylova]

[Text] A proposal is made to include the developing organization's bank of algorithms and programs into the active phase of development of automated information processing systems. Basic stages and lines of the proposed design process are described in general form; adherence to this process may increase the labor productivity of the designers and improve the quality of the algorithms and programs they create. Figures--1; bibliographic references--3.

UDC 681.3.53

GENERAL-PURPOSE DATA BASE MANAGEMENT SYSTEM FOR THE BESM-6 COMPUTER

[Abstract of article by A. V. Zamulin, V. G. Kotel'nikova, V. I. Korablev, B. N. Pishchik, and V. A. Tarsyuk]

[Text] An examination is made of the possibilities and architecture of a general-purpose data base management system employing a problem-oriented programming language and intended for development of information systems belonging to different classes and having applications in a variety of fields. Figures--3; bibliographic references--3.

UDC 681.3.01

USE OF RELATION ASSOCIATORS IN THE RELATION ASSOCIATION OPERATION OF A PAL'MA DATA BASE MANAGEMENT SYSTEM

[Abstract of article by R. P. Kramarenko and T. V. Kostruba]

[Text] The requirements and principles of constructing a conceptual scheme in a data base management system providing for multilevel display of data sets are examined. Different forms of relation associators are proposed as alternative solutions. Figures--3; bibliographic references--4.

UDC 681.31

DISCRETE DATA STORAGE AND PROCESSING SYSTEM

[Abstract of article by L. K. Vykhandu, T. F. Luchkovskiy, T. I. Mikli, and Ya. Ya. Tepandi]

[Text] The capabilities, structure, and language facilities of a discrete data storage and processing system developed on the basis of a Codasyl-type data base management system are described. The system is intended for input, checking, and updating of documents, for retrieval and output of the necessary information, and for report writing. Figures--2; bibliographic references--3.

UDC 681.325

ONE APPROACH TO MAKING DATA RELIABLE IN AUTOMATED CONTROL SYSTEMS

[Abstract of article by Yu. P. Rudnev and V. M. Zotov]

[Text] A method for detecting and automatically correcting errors made during preparation of digital data is examined and analyzed. The method is based on the use of a two-dimensional iterative code. Figures--2; tables--1; bibliographic references--6.

UDC 681.3.06.4

ORGANIZATION OF VISUAL DISPLAY OF RESULTS IN FULL-SCALE TEST DATA PROCESSING SYSTEMS

[Abstract of article by G. I. Korniyenko, M. I. Dianov, and V. I. Dianov]

[Text] A method for organizing the output, in real time and on raster displays, of moving images representing graphs of a single variable is proposed. A real system is described. Figures--5; bibliographic references--7.

UDC 621.391.396

A HARDWARE-SOFTWARE COMPLEX FOR SCIENTIFIC RESEARCH IN TEMPORAL AND ENERGY SPECTROSCOPY

[Abstract of article by Yu. N. Raspopov, I. S. Shevchenko, and N. G. Shevchenko]

[Text] The basic principles of designing a hardware-software complex for scientific research involving temporal and energy spectroscopy are presented. A functional block diagram of the complex is described, as is its technical implementation, using automation of experiments on inclined ionosphere probing as an example. Figures--1; bibliographic references--3.

UDC 681.3.06.068

PROGRAMMING AUTOMATION SYSTEM FOR SOLUTION OF EXPERIMENTAL DATA PROCESSING PROBLEMS

[Abstract of article by G. B. Korzhov]

[Text] A description is given of the FORMOD system, which can be used to design operating processing programs on the basis of an algorithm written in the problem-oriented language FORMOD. Figures--1.

UDC 681.322

A SYSTEM FOR AUTOMATING DEVELOPMENT OF COMPLEX OBJECTS--LARGE POWER PRODUCTION MACHINES

[Abstract of article by Ye. D. Solozhentsev]

[Text] Problems associated with design prediction and the planning of development and trouble-shooting, decision making, and failure prediction in the course of current development of complex objects are examined. The procedures for operational development of complex objects in an integrated automated control system are described. Decisions for recording, identifying, and analyzing processes are examined as are decisions on automation of the programming of mathematical models and identification problems for the large power production machine development automation system. Bibliographic references--8.

UDC 681.322

AUTOMATED RECORDING OF AMPLITUDE-TIME CHARACTERISTICS OF THE ELECTRIC FIELD OF THE HEART IN ERGONOMIC RESEARCH

[Abstract of article by S. M. Makeyev]

[Text] Some problems associated with automating the recording of amplitude and time characteristics of the heart's electric field with the goal of creating automated systems for operational control of psychophysiological tension and the general functional condition of ergatic system operators are examined. An algorithm for automated recording at three vectorcardiographic points of contact is proposed. Figures--2; bibliographic references--4.

UDC 681.3.06

A PROGRAM PACKAGE FOR INTEGRATED ANALYSIS OF LINEAR AUTOMATIC CONTROL SYSTEMS

[Abstract of article by Yu. M. Limonov]

[Text] The composition and structure of a universal program package for analysis of automatic control systems to be used in the OS YeS system are examined. The package includes programs for finding the transfer function of the automatic control system on the basis of its flowchart, for analyzing this system by frequency and root methods, constructing statistical characteristics, and constructing the transfer process in a time domain. Figures--2; tables--1; bibliographic references--7.

UDC 681.31

STRUCTURE OF A PACKAGE OF APPLICATION PROGRAMS FOR DECISION MAKING USING A VECTOR CRITERION

[Abstract of article by L. G. Oleynichenko, V. A. Osipova, and N. P. Yashina]

[Text] The structure of a package of programs supporting decision making methods involving many quality criteria is examined. The package is organized on the basis of differences in information on the criteria and on the preferences of the individual making the decision. A detailed examination is made of the system of preferences in relation to groups of criteria, and of the system's relationship to a classification of situations requiring decision making. A variant of a dialog control program serving as the package's connecting link is proposed. Figures--1; bibliographic references--4.

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